

## Specifications and Tolerances Committee Interim Report

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### 300 INTRODUCTION

The Specifications and Tolerances (S&T) Committee (hereinafter referred to as "Committee") submits its Interim Report for consideration by the National Conference on Weights and Measures (NCWM). This report contains the items discussed and actions proposed by the Committee during its Interim Meeting in Jacksonville, Florida, January 22 - 25, 2006.

Table A identifies the agenda items in the Report by Reference Key Number, Item Title, and Page Number. The item numbers are those assigned in the Interim Meeting Agenda. A voting item is indicated with a "V" after the item number. An item marked with an "I" after the reference key number is an information item. An item marked with a "D" after the reference key number is a developing item. The developing designation indicates an item has merit; however, the item was returned to the submitter for further development before any action can be taken at the national level. An item marked with a "W" was withdrawn by the Committee and generally will be referred to the regional weights and measures associations because it either needs additional development, analysis, and input or does not have sufficient Committee support to bring it before the NCWM.

This Report contains many recommendations to revise or amend National Institute of Standards and Technology (NIST) Handbook 44 (HB 44), 2006 Edition, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices." Proposed revisions to the handbook(s) are shown in **bold face print** by ~~striking-out~~ information to be deleted and underlining information to be added. Requirements that are proposed to be nonretroactive are printed in **bold-faced italics**.

**Note:** The policy of NIST is to use metric units of measurement in all of its publications; however, recommendations received by the NCWM technical committees have been printed in this publication as they were submitted and may, therefore, contain references to inch-pound units.

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**Table C**  
**Glossary of Acronyms**

CC	Certificate of Conformance	NIST	National Institute of Standards and Technology
CWMA	Central Weights and Measures Association	NTEP	National Type Evaluation Program
EPO	Examination Procedure Outline	NTETC	National Type Evaluation Technical Committee
GPMA	Gasoline Pump Manufacturers Association	RMFD	Retail Motor-Fuel Dispenser
H44	NIST Handbook 44	SMA	Scale Manufacturers Association
H130	NIST Handbook 130	SWMA	Southern Weights and Measures Association
LMD	Liquid-Measuring Device	VTM	Vehicle-Tank Meter
LPG	Liquefied Petroleum Gas	WMD	Weights and Measures Division
MMA	Meter Manufacturers Association	WWMA	Western Weights and Measures Association
MFM	Mass Flow Meter	USNWG	NIST/OIML U.S. National Working Group
NCWM	National Conference on Weights and Measures		
NEWMA	Northeastern Weights and Measures Association, Inc.		
<p>“Handbook 44” means the 2006 Edition of NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices”</p> <p>“Handbook 130” means the 2006 Edition of NIST Handbook 130 “Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality.”</p>			
<p>Note: NIST does not imply that these acronyms are used solely to identify these organizations or technical topics.</p>			

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**Details of All Items  
(In Order by Reference Key Number)**

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**310      GENERAL CODE****310-1    V    G-S.1.(d) Identification ; Software for Not-Built-for-Purpose Devices****Source:** Western Weights and Measures Association (WWMA)**Recommendation:** Modify paragraph G-S.1.(d) as follows:

**G-S.1. Identification.** - All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:

- (a) the name, initials, or trademark of the manufacturer or distributor;
- (b) a model identifier that positively identifies the pattern or design of the device;
  - 1. *The model identifier shall be prefaced by the term "Model," "Type," or "Pattern." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals or all lower case.*  
*[Nonretroactive as of January 1, 2003]*  
*(Added 2000) (Amended 2001)*
- (c) a nonrepetitive serial number, except for equipment with no moving or electronic component parts and not-built-for-purpose, software-based devices;  
*[Nonretroactive as of January 1, 1968]*  
*(Amended 2003)*
  - 1. *The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.*  
*[Nonretroactive as of January 1, 1986]*
  - 2. *Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).*  
*[Nonretroactive as of January 1, 2001]*
- (d) the current software version **or revision** identifier for not-built-for-purpose, software-based devices;  
*[Nonretroactive as of January 1, 2004]*  
*(Added 2003)*
  - 1. **The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.**  
**[Nonretroactive as of January 1, 2007]**  
**(Added 2006)**

2. Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the term Number. Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the term Number. The abbreviation for the term "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).

[Nonretroactive as of January 1, 2007]

(Added 2006)

- (e) *an NTEP Certificate of Conformance (CC) number or a corresponding CC Addendum Number for devices that have a CC. The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the term "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).*

*[Nonretroactive as of January 1, 2003]*

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.

**(Amended 1985, 1991, 1999, 2000, 2001, and 2003, and 2006)**

**Discussion:** At its Fall 2005 Annual Meeting, the WWMA reviewed a proposal to add to paragraph G-S.1. requirements for identifying the required software version designation for not-built-for-purpose devices using acceptable words, abbreviations, or symbols. This is consistent with the current requirements to identify other markings such as the serial number or model designation. The WWMA agreed to forward the proposal shown above to the Committee for consideration.

At its 2005 fall meeting, the CWMA agreed with the intent of the WWMA proposal, but suggested that the word "designation" for software be changed to "identification." NEWMA supported the WWMA proposal as a developing item. The SWMA recommended the proposal be a voting item on the Committee's 2006 agenda.

At the 2006 NCWM Interim Meeting, the SMA supported this item with the comment that the word "designation" is redundant and that the word "revision" should be an acceptable alternative to the word "version." The Committee agreed with SMA that "designation" as an identifier is redundant and that "revision" is a commonly used term. One manufacturer commented that on devices using a 7-segment display the letter "V" cannot be displayed. The Committee commented that the letters "N" or "M", which are already recognized, also cannot be shown on a 7-segment display. The Committee modified Item 310-1 as shown above and agreed to present the item for a vote at the 2006 NCWM Annual Meeting since the intent of the proposal is to gain uniformity in the identifier prefix for marking information already required in G.S.1.

### **310-2 V G-S.1.1. Location of Marking Information for Not-Built-for-Purpose Software-Based Devices**

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** Modify paragraph G-S.1.1. as follows:

***G-S.1.1. Location of Marking Information for Not-Built-For-Purpose, Software Based Devices. - For not-built-for-purpose, software based devices, the ~~following shall apply:~~ required information in G-S.1. Identification. (a), (b), (d), and (e) shall:***

- (a) ~~the manufacturer or distributor and the model designation~~ *be continuously displayed or marked on the device (see note below); or*
- (b) *the Certificate of Conformance (CC) Number shall be continuously displayed or marked on the device (see note below), or*
- (eb) ~~all required information in G-S.1. Identification. (a), (b), (d), and (h) shall be continuously displayed. Alternatively, a clearly identified "view only" System Identification, G-S.1. Identification, or Weights and Measures Identification shall be accessible through the "Help" menu. Required information~~

~~includes that information necessary to identify that the software in the device is the same type that was evaluated.~~ shall be accessible through the "Help" an easily recognized menu, and if necessary a submenu; or

(d) have the G-S.1. identification permanently marked on the device.

Note: Examples of menu and submenu identification include, but are not limited to "Help," "System Identification," "G-S.1. Identification," or "Weights and Measures Identification."

**Note:** Clear instructions for accessing the remaining required G-S.1. information shall be listed on the CC. Required information includes that information necessary to identify that the software in the device is the same type that was evaluated.

[Nonretroactive as of January 1, 2004]  
(Added 2003)(Amended 2006)

**Discussion:** At its Fall 2005 Annual Meeting, the WWMA reviewed a proposal to modify paragraph G-S.1.1. to clarify what information must be marked, displayed, or accessible through the help menu on not-built-for-purpose software-based devices. The WWMA agreed to forward the proposal to the Committee for consideration.

At their 2005 fall meetings, the CWMA supported the concept of the WWMA proposal, but suggested the proposal remain a developing item pending input from the new NTETC Software Sector scheduled to begin activities in the spring of 2006. The SWMA supported the WWMA proposal, but questioned if the word "Help" is the only word that can be used to identify the function that accesses the weights and measures menu.

At the 2006 NCWM Interim Meeting, the SMA supported this item, but recommended that paragraph G-S.1.1.(b) be eliminated as it is already contained in paragraph G-S.1.1.(c). The Committee also heard additional input that access identification should not be limited to the term "Help" as currently listed in paragraph G-S.1.1. The Committee modified Item 310-2 to address the stated concerns and agreed to present the item for a vote at the 2006 NCWM Annual Meeting.

### **310-3 I G-S.8.1. Multiple Weighing or Measuring Elements with a Single Provision for Sealing**

**Source:** Western Weights and Measures Association (WWMA)

**Discussion:** The Committee is considering a proposal to add a new paragraph G-S.8.1. as follows:

**G-S.8.1. Multiple Weighing or Measuring Elements with a Single Provision for Sealing. - A change to the metrological parameters (calibration or configuration) of any weighing or measuring element shall be individually identified.**

[Nonretroactive as of January 1, 200X]

**Note: Examples of acceptable identification of a change to the metrological parameters of a weighing or measuring element include, but are not limited to:**

- (1) **a broken, missing, or replaced physical seal on an individual weighing, measuring, or indicating element or active junction box;**
- (2) **a change in a calibration factor or configuration setting for each weighing or measuring element;**
- (3) **a display of the date of or the number of days since the last calibration or configuration event for each weighing or measuring element; or**
- (4) **counters indicating the number of calibration or configuration events per weighing or measuring element.**

(Added 200X)

At its September 2005 Annual Meeting, the WWMA reviewed a proposal to add to all the liquid-measuring device codes requirements for identifying when an adjustment is made to any measuring element in a device which has multiple measuring elements but that is only equipped with a single provision for sealing the adjustment mechanism. The

proposed requirement is similar to the requirements in Section 3.30. Paragraph S.2.2.1. Multiple Measuring Elements with a Single Provision for Sealing. The submitter of the proposal suggested an alternative approach in which the requirement would be added to the General Code to address all weighing and measuring devices. The WWMA favored the alternative proposal to modify the General Code and received no opposition from either the weighing industry or the measuring industry representatives present at the meeting. Therefore, the WWMA agreed to forward the proposal to the Committee for consideration.

At their 2005 fall meetings, the CWMA and the SWMA both supported the proposal and recommended it be added to the Committee's 2006 agenda.

At the 2006 NCWM Interim Meeting, the Committee heard that the SMA opposed this item because it is not appropriate for all devices. The Committee also heard that the list of examples should include an acceptable means for securing systems where access to adjustments is controlled by a physical seal on the indicator. The Committee believes that when systems have multiple weighing or measuring elements with a single provision for sealing, a General Code requirement for identification of adjustments to individual weighing or measuring elements is appropriate regardless of device type. The Committee modified Item 310-3 to include indicators and active junction boxes. The Committee believes that it is important to be sure no specific Handbook 44 codes are adversely affected by placing the requirements in the General Code; therefore, the Committee agreed to make Item 310-3 an information item to provide the opportunity for the National Type Evaluation Technical Committee Sectors and the regional weights and measures associations to evaluate the item further, especially for any adverse impact on a particular device type(s).

#### **310-4 W G-T.1. (e) Acceptance Tolerances**

**Source:** Carryover Item 310-2. (This item originated from the National Type Evaluation Technical Committee (NTETC) Measuring Sector and first appeared on the Committee's 2005 agenda.)

**Discussion/Background:** The Committee considered a proposal to modify paragraph G-T.1. (e) as follows:

##### **G-T.1. Acceptance Tolerances. - Acceptance tolerances shall apply to:**

- (a) equipment to be put into commercial use for the first time;
- (b) equipment that has been placed in commercial service within the preceding 30 days and is being officially tested for the first time;
- (c) equipment that has been returned to commercial service following official rejection for failure to conform to performance requirements and is being officially tested for the first time within 30 days after corrective service;
- (d) equipment that is being officially tested for the first time within 30 days after major reconditioning or overhaul; and
- (e) equipment undergoing type evaluation **(special test tolerances are not applicable)**.  
(Amended 1989 **and 200X**)

At its October 2004 meeting, the NTETC Measuring Sector noted that the intent of paragraph G-T.1.(e) was to specify that acceptance tolerances apply to all equipment undergoing type evaluation; however, the language is not clear regarding what tolerance would apply during "special tests."

Special test tolerances are intended to recognize that a larger tolerance for test drafts conducted under certain conditions, such as at a slow rate of flow, is appropriate. Normal wear of the measuring elements frequently produces larger performance errors at a slow flow rate, compared to performance errors at full flow rate. The Sector agreed that devices submitted for NTEP evaluation should be held to a higher standard than devices in normal service and special test tolerances should not be applicable during an NTEP evaluation.



At the 2005 NCWM Annual Meeting, the MMA indicated they had not understood that the proposal submitted to the Committee from the Measuring Sector would apply to all types of liquid-measuring devices submitted for NTEP evaluation. The MMA thought the proposed requirement would apply only to retail motor-fuel dispensers. The MMA stated that without special test tolerances, most meters, especially those installed in vehicle-mounted applications, would not meet tolerances for tests conducted at lower flow rates during both field and NTEP evaluations. The Committee agreed to make the proposal an information item to allow the MMA and the Measuring Sector additional time to develop an alternate proposal.

At its October 2005 meeting, the NTETC Measuring Sector agreed with the MMA that some devices should have a larger tolerance for special tests conducted during type evaluation and forwarded a recommendation to the Committee that it withdraw this item and instead amend Section 3.30. as shown in Item 330-5.

At the 2006 NCWM Interim Meeting, the Committee agreed to withdraw Item 310-4 from the S&T Committee Agenda as requested by the NTETC Measuring Sector.

## 320 SCALES

### 320-1 V S.1.1. (c) Zero Indication; Requirements for Markings or Indications for Other than Digital Zero Indications

**Source:** Carryover Item 320-1. (This item originated from the Committee and first appeared on its 2004 agenda.)

**Recommendation:** Amend paragraph S.1.1.(c) as follows:

#### S.1.1. Zero Indication.

- (a) On a scale equipped with indicating or recording elements, provision shall be made to either indicate or record a zero-balance condition.
- (b) On an automatic-indicating scale or balance indicator, provision shall be made to indicate or record an out-of-balance condition on both sides of zero.
- (c) A zero-balance condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition **and is marked or includes supplemental indications to indicate that the "other than continuous digital zero indication" represents a no-load condition of the scale.**  
Added 1987 (Amended 1993 **and 2006**)

**Note: The markings or supplemental indications in S.1.1.(c) are not required if, prior to the start of a transaction: (1) operator intervention is required to verify the zero balance condition with a digital zero indication, or (2) for a scale equipped to indicate a zero balance condition by a digital zero indication, the scale automatically resets to a digital zero indication.**

**(Added 2006)**

(Amended 1987)

**Background/Discussion:** Past inconsistencies and ongoing disagreements about the interpretation of paragraph S.1.1.(c) warranted an effort to clarify the intent of the requirement. The proposed changes to the requirement specify that all primary indicators on scales that use anything other than a digital zero indication (e.g., scrolling messages, dashes, etc.) to indicate zero require additional markings or indications to inform customers that the scales are at a zero-balance condition. No markings are necessary on these devices when operator intervention is required to return the indication to a digital zero before conducting a transaction.

The Committee agreed that General Code paragraphs G-S.6. Marking Operational Controls, Indications, and Features, and S.1.1. require weighing devices to be marked or provide an indication that states the zero-balance is represented by other than a digital zero indication. Historically, this position is supported by the 1993 amendment to

paragraph S.1.1.(c) as well as type evaluation requirements and other requirements adopted to ensure that customers have sufficient information about displays and recorded transaction information to make an informed decision during a direct sale transaction.

At the July 2005 NCWM Annual Meeting, the Committee changed the status of the item from “voting” to “information” to allow additional time to determine: (1) if the proposed markings could be displayed as part of the indication rather than being physically marked on the device and (2) if self-service systems provide information on the zero-load condition of the scale prior to each weighing.

In the fall of 2005, several regional associations and the NTETC Weighing Sector reconsidered the proposal. After hearing opposition to the proposal from the SMA, the WWMA indicated that the proposal should remain an information item pending a review by the Weighing Sector. The CWMA restated its earlier position that the proposal should be withdrawn because appropriate protections and labeling criteria are applied during type evaluation. A majority of the Sector’s membership voted against the proposal because they did not believe labeling is necessary if a scale has an automatic means to inhibit a transaction when it is out of balance or returns to a continuous digital indication when in an out-of-balance condition.

At its September 2005 meeting, the Weighing Sector members voted not to support the proposal as written. The Weighing Sector agreed that additional markings would not be required during type evaluation on devices that have an effective automatic means to inhibit a weighing operation or return the device to a continuous digital indication when the scale is in an out-of-balance condition.

The SMA opposed the proposal because the current language in paragraph S.1.1.(c) provides sufficient guidance to prevent use of this feature to facilitate fraud. The SMA supported the analysis of the issue made by the Weighing Sector.

The Committee supports additional markings to clarify when zero is indicated by other than a continuous digital zero indication based on General Code paragraph G-S.6. Marking Operational Controls, Indications, and Features and the 1993 interpretation made by the S&T Committee. The Committee noted that the proposed language is not in conflict with current practices or recently modified language in Publication 14 that NTEP laboratories use to address this situation. The Committee also believes the changes are needed to provide definitive guidelines to the field official and in support of corresponding language in NCWM Publication 14. The Committee believes there is sufficient language in the proposal to address instances where the original equipment manufacturer elects to display rather than mark the information (i.e., supplemental indications). Additionally, the Committee slightly modified the note, which it added to the proposal in 2005, and believes that it addresses some of the Weighing Sector’s concern about unnecessarily requiring labeling when weighing operations are inhibited on a device in an out-of-balance condition. The proposal is meant to be a retroactive requirement and, therefore, applies to all equipment including self-service applications that have undergone type evaluation.

For additional background information, refer to the 2004 and 2005 S&T Final Reports of the 89<sup>th</sup> and 90<sup>th</sup> NCWM.

**320-2 I S.1.4.6. Height and Definition of Minimum Reading Distance, UR.2.10. Primary Indicating Elements Provided by the User, UR.2.11. Minimum Reading Distance, and Definitions of Minimum Reading Distance and Primary Indications**

**Source:** National Type Evaluation Technical Committee Weighing Sector

**Discussion:** The Committee considered the Weighing Sector’s first attempt at a proposal that adds new paragraphs S.1.4.6., UR.2.10., and UR.2.11. to the Scales Code and adds new definitions of “minimum reading distance” and “primary indications” to Appendix D as follows:

**S.1.4. Indicators.**

**S.1.4.6. Height. - All primary indications shall be indicated clearly and simultaneously.**

- (a) **On digital devices that display primary indications during direct sales to the customer, the numerical figures displayed to the customer shall be at least 9.5 mm (0.4 in) high.**

(b) The units of mass and other descriptive markings or indications, such as lb, kg, gross, tare, net, etc., shall be clearly and easily read and shall be at least 2 mm (0.08 in) high.  
[Nonretroactive as of January 1, 2007]  
(Added 200X)

## UR.2. Installation Requirements

UR.2.10. Primary Indicating Elements Provided by the User. – Primary indicating elements that are not the same as the primary indicating elements provided by the original equipment manufacturer (e.g., video display monitors) shall comply with the following:

- (a) On digital devices that display primary indications during direct sales to the customer, the numerical figures displayed to the customer shall be at least 9.5 mm (0.4 in) high.
- (b) The units of mass and other descriptive information, such as gross, tare, net, etc., shall be displayed or marked on the device and shall be at least 2 mm (0.08 in) high.  
(Added 200X)

UR.2.11. Minimum Reading Distance – On digital devices that display primary indications, the height of the numbers expressed in millimeters should be not less than 3 times the minimum reading distance expressed in meters, without being less than 2 mm (0.08 in). (Example: If the height of the primary indications is 10 mm, then the minimum reading distance should not be greater than 30 m).  
(Added 200X)

minimum reading distance. The shortest distance that an observer is freely able to approach the indicating device to take a reading under normal conditions of use. This approach is considered to be free for the observer if there is a clear space of at least 0.8 m in front of the indicating device. However, if the minimum reading distance “S” in Figure X is less than 0.8 m, then the minimum reading distance is “L” in Figure X. [2.20]  
(Added 200X)

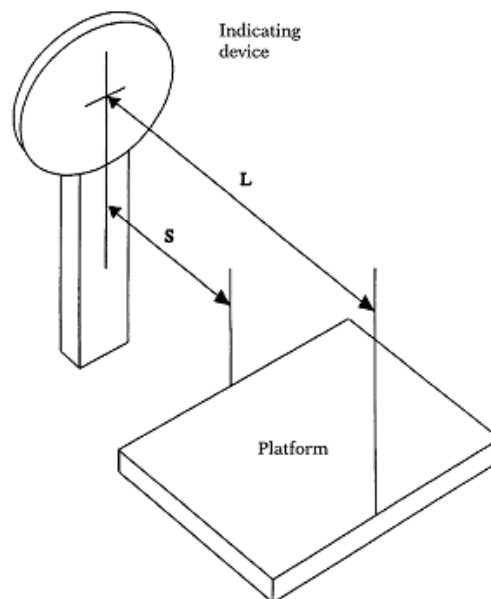


Figure X

**primary indications. Weight or other units of measurement values that are displayed by a primary indicating element. The primary indications are used as the determining factor in arriving at the sale representation when the device is used commercially. (Examples of primary indications include the measurement value, unit price or count, and total price on instruments capable of price computing. Primary indications do not include indications from auxiliary indicating devices such as totalizing registers and pre-determined stop mechanisms.) [1.10], [2.20] (Added 200X)**

This proposal was developed to address a growing problem with the readability of weight indications and the values that define transaction information. Field and laboratory officials indicate that both are becoming increasingly smaller, as demonstrated in the following example of a weight display where the actual size of the weight values are 23 mm in height, but the unit of measurement (g) is 4 mm in height.



The field and laboratory officials need more specific requirements in order to consistently determine if indications are suitable for the environment in which the device is used. Currently only the Taximeters, Grain Moisture Meters, and Near-Infrared Grain Analyzers Codes include requirements that specify the minimum height of figures, words, and symbols. NIST Handbook 44 and NCWM Publication 14 include no uniform size requirements or guidelines on how to evaluate display information for clarity and readability. The size requirements for all three device technologies were developed primarily because of concerns about the visibility of indications from the customer's position.

The Weighing Sector developed and voted on a proposal which provides guidelines for determining whether or not indications are appropriate in a particular installation. The Weighing Sector's proposal was aligned with OIML R 76 requirements for visibility of indications to the customer in direct sale applications, minimum height of lettering for identification information, and the minimum height of numbers for analog indicating devices.

In 1999 a similar proposal to amend General Code paragraph G-S.5.2.3. Size and Character to include minimum height requirements was considered but later withdrawn. GPMA expressed strong opposition to the 1999 proposal because many of the liquid-measuring and metering devices were equipped with quantity displays that would not meet the proposed 9.5 mm size requirement. While the Committee agreed at the time that officials need uniform guidelines that are not ambiguous as to which transaction information must meet size requirements. The Committee also believed that any future proposals should address a specific device technology since it is difficult to address all device configurations and the environmental conditions that exist at each installation site.

After its September 2005 meeting, the Weighing Sector agreed to further develop the proposal for a requirement that specifies the height of the weight results and its corresponding unit of measurement indications to ensure that information is adequately visible to the customer in direct sale applications. The Weighing Sector agreed that any proposed language should be aligned with OIML R 76 height requirements to the extent possible. After submitting the proposed language to the Committee, the Weighing Sector balloted its members with expectations of only minor changes to the proposal. The Weighing Sector supported the proposed new definition of "primary indications" and alternate wording for proposed new paragraph S.1.4.6. as follows:

**S.1.4.6. Height. - All primary indications shall be indicated clearly.**

(a) **On digital devices that display primary indications during direct sales to the customer, the numerical figures displayed to the customer shall be at least 9.5 mm high.**

(b) **The units of mass and other descriptive information such as gross, tare, net, etc., shall be displayed or marked on the device and shall be at least 2 mm high.**

**[Nonretroactive as of January 1, 2007]**

**(Added 2006)**

Receiving feedback that the definition and illustration of a minimum reading distance were confusing, the Weighing Sector learned that it did not have a consensus on the proposal or the language for corresponding user requirements for primary indicating elements that are provided by the user. Likewise, the SMA opposed the proposal because it believed a reading distance requirement is unenforceable.

The Committee also received comments from a measurement consultant that the proposal is unnecessary. General Code paragraph G S.5.1. Indicating and Recording Elements can be applied in type approval and thus eliminates the need to borrow any corresponding language from R 76 or add any language to Handbook 44. Comments suggested that the United States should stick to performance-based requirements, noting that the proposal does not adhere to that principal.

The Committee agreed that although the clarity and readability of indications is a growing issue, the proposal has only limited support from the public and private sectors. The Committee recognized the proposal requires a significant amount of work before the language is clear, technically correct, and deemed applicable to the different types of installations and technologies in use. The Committee agreed to make the proposal an information item since the Weighing Sector has a group actively working on the language.

**320-3 V N.1.3.1. Bench or Counter Scales, N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers, and Appendix D; Definitions of Bench Scale and Counter Scale**

**Source:** Carryover Item 320-6. (This item originated from the National Type Evaluation Technical Committee (NTETC) Weighing Sector and first appeared on the Committee's 2005 agenda.)

**Recommendation:** Delete paragraph N.1.3.1. and renumber subsequent paragraphs.

**N.1.3. Shift Test.**

**~~N.1.3.1. Bench or Counter Scales.— A shift test shall be conducted with a half capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element.~~**

Renumber and amend paragraph N.1.3.8. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers as follows:

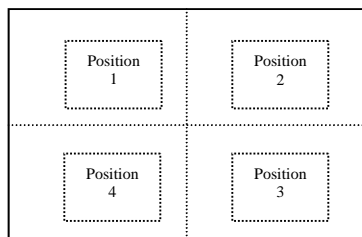
**N.1.3.87. All Other Scales Except Crane Scales, Hanging Scales, Hopper Scales, Wheel-Load Weighers, and Portable Axle-Load Weighers.** A shift test shall be conducted using the following prescribed test loads and test patterns. **A single field standard weight used as the prescribed test load shall be applied centrally in the prescribed test pattern. When multiple field standard weights are used as the prescribed test load, the load shall be applied in a consistent pattern in the shift test positions throughout the test and applied in a manner that does not concentrate the load in a test pattern that is less than when that same load is a single field standard weight on the load-receiving element.**

(a) **For scales with a nominal capacity greater than 500 kg (1 000 lb), a shift test may be conducted by either using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in**

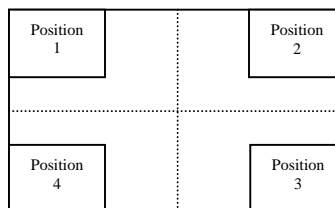
**Figure 1 below, or by using a one-quarter nominal capacity test load centered as nearly as possible, successively, over each corner of the load-receiving element using the prescribed test pattern as shown in Figure 2 below.**

- (b) **For scales with a nominal capacity of 500 kg (1 000 lb) or less, a shift test shall be conducted using a one-third nominal capacity test load (defined as test weights in amounts of at least 30 % of scale capacity, but not to exceed 35 % of scale capacity) centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1 below.**
- (c) For livestock scales, ~~the~~ shift test ~~load~~ shall be conducted using either a test load that does not exceed one-half the rated section capacity or one-half the rated concentrated load capacity, whichever is applicable. ~~A shift test shall be conducted using either:~~ **centered as nearly as possible at the center of each quadrant of the load-receiving element using the prescribed test pattern as shown in Figure 1 below, or one-quarter the rated section capacity or one-quarter the rated concentrated load capacity load centered as nearly as possible, successively over each corner of the load-receiving element using the prescribed test pattern as shown in Figure 2 below.**
- (a) ~~A one quarter nominal capacity test load centered as nearly as possible, successively over each main load support as shown in the diagram below; or~~
- (b) ~~A one half nominal capacity test load centered as nearly as possible, successively at the center of each quarter of the load-receiving element as shown in the diagram below.~~
- (Amended 1987, ~~and~~ 2003, ~~and~~ 2006)

**Figure 1**



**Figure 2**



(Added 2003)  
**(Amended 2006)**

Delete Appendix D definitions for “bench scale” and “counter scale” as follows:

~~bench scale. See "counter scale."~~~~[2.20]~~

~~counter scale. One that, by reason of its size, arrangement of parts, and moderate nominal capacity, is adapted for use on a counter or bench. Sometimes called "bench scale."~~~~[2.20]~~

**Discussion:** The proposal is intended to clarify the appropriate shift test pattern and test loads for bench/counter scales and other platform-type scales. Currently, bench and counter scale shift tests are conducted with a one-half capacity test load centered successively at four points equidistant between the center and the front, left, back, and right edges of the load-receiving element. Other platform scale shift tests are conducted with a one-half capacity test load centered, as nearly as possible, successively at the center of each quadrant. The proposal eliminates references to bench and counter scales and instead prescribes that the shift test load and test pattern used for those and all scales other than livestock be based on the scale’s nominal capacity. For livestock scales the proposal further clarifies, but does not change, the existing requirements for shift tests.

The proposal was kept on the agenda as an information item in response to comments indicating that data should be collected on shift tests to verify that the proposed test loads and positions are equivalent to existing test patterns.

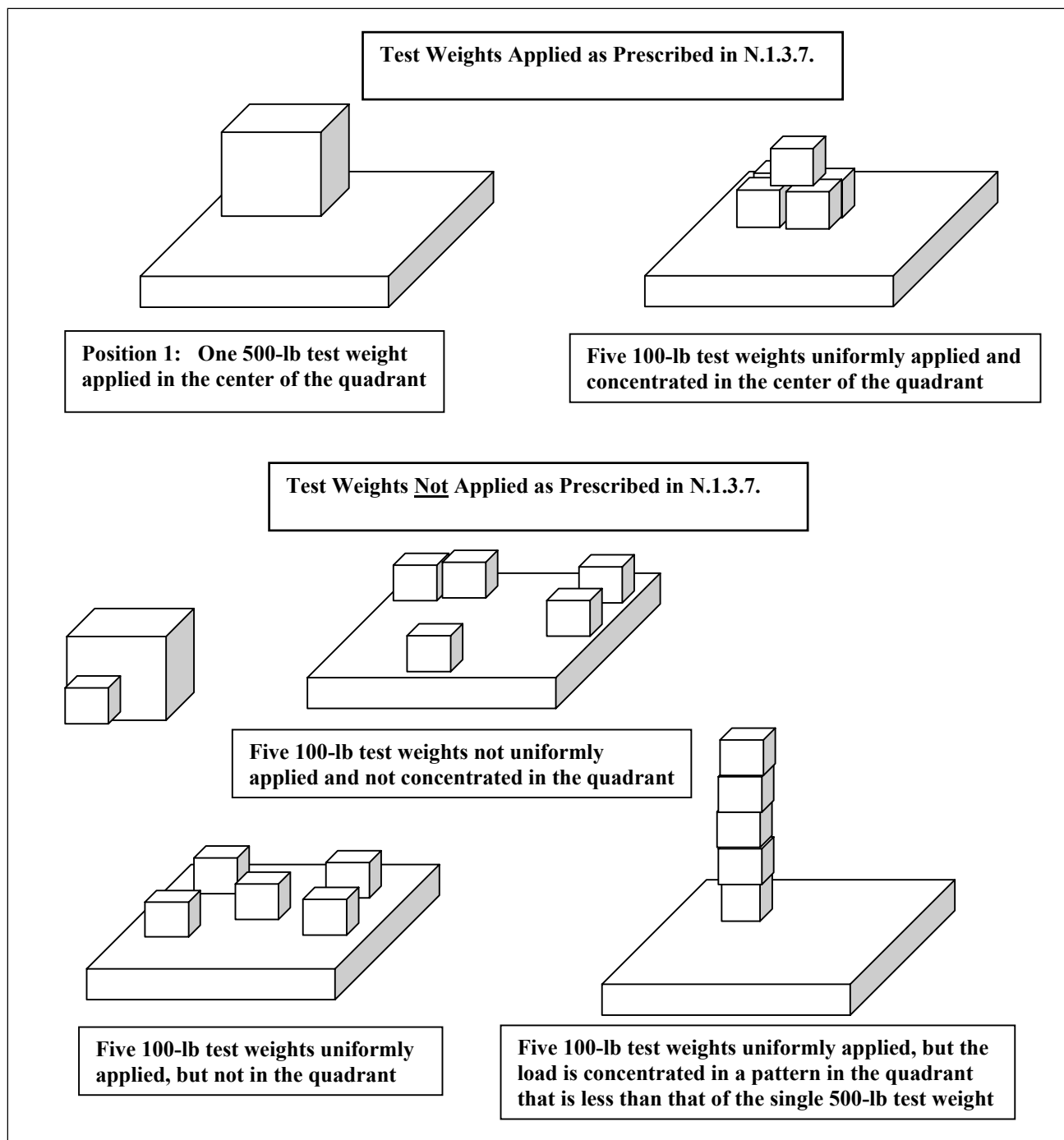
The WWMA and CWMA encouraged the Committee to keep the proposal an information item until more data could be collected and reviewed by the Weighing Sector, NIST, and the NTEP laboratories. The Committee also reviewed an alternate proposal recommended in 2005 by CWMA to modify paragraph N.1.3.8. The CWMA proposal differed from the Weighing Sector's proposal because the test pattern in Figure 2 was referenced in the test procedure for scales with a nominal capacity less than 300 lb, illustrated the load bearing points in Figure 2, and used other terminology for the term "quadrant."

During the 2006 NCWM Interim Meeting, the Committee received the results of data for shift tests conducted using current shift test requirements and shift tests conducted using the proposed test requirements on the same scales. Comments were also received from the public and private sectors in support of the proposal. The SMA supported the proposal. The NIST technical advisor to the Weighing Sector provided a summary of data gathered by multiple jurisdictions on 207 scales that demonstrates the proposed procedures (i.e., shift test loading pattern and the amount of test weights) based on scale capacity are adequate to demonstrate that an instrument with load points of any design configuration can meet performance tolerances during off-center loading. There is no demonstrated difference in scale performance based on the location of the scale, thus the terms "bench" and "counter" should be eliminated.

The NIST WMD supported the intent of the proposal with two changes to clarify what is meant by one-third nominal capacity and the proper placement of test weights to avoid overloading load points. WMD recommended language that specifies the test load at one-third capacity shall not be less than 30 % or greater than 35 % of scale capacity. WMD also noted inconsistencies in the manner in which weights are distributed within the test pattern during shift tests; therefore, it also recommended including language in renumbered paragraph N.1.3.7. that specifies "when multiple test weights are used, the load shall not be concentrated in a test pattern greater than that which a single weight would occupy."

Consequently, the Committee modified the entire proposal, parts (a) through (c), to include language that is technically correct and consistent in its description of how to conduct a shift test on all types of scales. The Committee modified the language to (1) clarify what defines "acceptable" weight values for a test load that is one third of the scale's nominal capacity, (2) ensure uniform procedures are followed when applying test weights on the load-receiving element, and (3) eliminate instances where test weights are concentrated in a pattern that overloads the load points as illustrated below.

Given a livestock scale with a section capacity of 1 000 lb, a shift test is performed as shown in Figure 1 (see page S&T - 13), using a test load of 500 lb.



The NIST technical advisor to the Weighing Sector will continue to collect data through April 2006 to provide additional support for the modification. The Committee agreed there is sufficient data to warrant adoption of the proposal at the July 2006 NCWM Annual Meeting. However, unless the Committee receives data indicating there are problems with the proposed shift test procedures, the proposal will remain a voting item on its agenda.

For more background information, refer to the Committee's 2005 Final Report of the 90<sup>th</sup> NCWM Annual Report.



**320-4 V Table 4. Minimum Test Weights and Test Loads**

**Source:** Northeastern Weights and Measures Association (NEWMA)

**Recommendation:** Modify Table 4. Minimum Test Weights and Test Loads as follows:

<b>Table 4.</b> <b>Minimum Test Weights and Test Loads<sup>1</sup></b>			
Device capacity	Minimums (in terms of device capacity)		(where practicable)
	Test weights (greater of)	Test loads <sup>2</sup>	
0 to 150 kg (0 to 300 lb)	100 %		
151 to 1 500 kg (301 to 3 000 lb)	25 % or 150 kg (300 lb)	75 %	Test weights to dial face capacity, 1 000 d, or test load to used capacity, if greater than minimums specified  During initial verification, a scale should be tested to capacity.
1 501 to 20 000 kg (3 001 to 40 000 lb)	12.5 % or 500 kg (1000 lb)	50 %	
20 001 kg+ <u>to</u> <u>250 000 kg</u> (40 001 lb+ <u>to 500 000 lb</u> )	12.5 % or 5 000 kg (10 000 lb)	25 % <sup>3</sup>	
<u>250 001 kg+</u> <u>(500 001 lb+)</u>	<b>12.5 % or 30 000 kg</b> <b>(62 500 lb)</b>	<u>25 %<sup>3</sup></u>	

<sup>1</sup> If the amount of test weight in Table 4 combined with the load on the scale would result in an unsafe condition, then the appropriate load will be determined by the official with statutory authority.

<sup>2</sup> The term "test load" means the sum of the combination of field standard test weights and any other applied load used in the conduct of a test using substitution test methods. Not more than three substitutions shall be used during substitution testing, after which the tolerances for strain load tests shall be applied to each set of test loads

<sup>3</sup> The scale shall be tested from zero to at least 12.5 % of scale capacity using known test weights, and then to at least 25 % of scale capacity using either a substitution or strain load test that utilizes known test weights of at least 12.5 % of scale capacity. Whenever practical, a strain load test should be conducted to the used capacity of the scale. When a strain load test is conducted, the tolerances apply only to the test weights or substitution test loads.  
(Amended 1988, 1989, 1994, and 2003)

[**Note:** GIPSA requires devices subject to their inspection to be tested to at least "used capacity," which is calculated based on the platform area of the scale and a weight factor assigned to the species of animal weighed on the scale. "Used capacity" is calculated using the formula:

Used Scale Capacity = Scale Platform Area x Species Weight Factor

Where species weight factor = 540 kg/m<sup>2</sup> (110 lb/ft<sup>2</sup>) for cattle, 340 kg/m<sup>2</sup> (70 lb/ft<sup>2</sup>) for calves and hogs, and 240 kg/m<sup>2</sup> (50 lb/ft<sup>2</sup>) for sheep and lambs]

**(Amended 2006)**

**Discussion:** Some jurisdictions encounter scales with nominal capacities of 1 000 000 lb or more and must determine the minimum test loads needed to conduct an acceptable test. NEWMA believes that NIST Handbook 44 is flexible but does not provide any definitive guidelines on test loads for scales with high capacities. NEWMA modified its original proposal by reducing the scale maximum capacity from 1 000 000 lb to 500 000 lb and removing a footnote that permitted officials to establish the minimum test load. Industry and other regional associations have developed alternate proposals to address concerns that the original proposal did not address the minimum test weights and test load requirements for a scale with a nominal capacity greater than 500 000 lb.

This issue was part of the Developing Items agenda. However, in the fall of 2005, NEWMA, the original submitter of the proposal, agreed the proposal was ready for national consideration and should be a voting item on the Committee's 2006 agenda. The WWMA recommended the proposal remain a developing item. The CWMA recommended withdrawing the proposal since the current table already addresses most installations.

The SMA recommended that for scale capacities above 250 000 lb the greater of either 62 500 lb of test weights or 12.5 % of scale capacity be used to test the scale to at least 25 % of scale capacity using either "substitution" or "strain load" test methods. Additionally, SMA recommended, whenever possible, a strain load test should be conducted up to the scale's nominal capacity.

The Committee agreed to the SMA proposal; however, it kept the requirement for testing with the "greater of" a percentage of scale capacity or specified amount of test weights as applicable to scales with capacities greater than 300 lb to ensure that a sufficient test load is selected to test the performance of larger capacity scales.

### 320-5 W Table 6. Maintenance Tolerances

**Source:** Carryover Item 320-7. (This item originated from the NIST Weights and Measures Division (WMD) and first appeared on the Committee's 2005 agenda.)

**Discussion:** The original intent of the step tolerances was to provide a relationship between scale accuracy and scale resolution. The Committee considered a proposal to modify Table 6 as follows to meet that objective.

<b>Table 6.</b> <b>Maintenance Tolerances</b> <b>(All values in this table are in <u>verification</u> scale divisions <u>e</u>)</b>				
<b>Tolerance in <u>verification</u> scale divisions <u>e</u></b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>5</b>
<b>Class</b>	<b>Test Load</b>			
I	0 - 50 000	50 001 - 200 000	200 001 +	
II	0 - 5 000	5 001 - 20 000	20 001 +	
III	0 - 500	501 - 2 000	2 001+ - <b>4 000</b>	<b>4 001+</b>
III	0 - 50	51 - 200	201+ - <b>400</b>	<b>401+</b>
III L	0 - 500	501 - 1 000	(Add 1 <del>de</del> for each additional 500 <del>de</del> or fraction thereof)	

**(Amended 200X)**

The USNWG on R 76 "Non-automatic Weighing Instruments" agreed that NIST Handbook 44 Class III and Class IIII tolerances should be aligned with OIML R 76. Manufacturers indicated that they build identically performing instruments and load cells for both U.S. and international markets. However, some industry representatives are concerned about eliminating the 5 d tolerance step because of questions about the ability of many scales and load cells with an  $n_{\max}$  greater than 5 000 e to comply with the temperature effect at zero in U.S. and OIML requirements.

The current Class III L tolerance structure in NIST Handbook 44 deviates most from the original intent of the step tolerances. A scale with a higher resolution is not an indication of a higher level of accuracy for devices set to meet Table 6 tolerances. For example, if a Class III L scale has an  $e = 20$  lb, then at 80 000 lb the maintenance tolerance would be  $\pm 8 e$  (160 lb), whereas a Class III scale with an  $e = 50$  lb would have a  $\pm 2 e$  (100 lb) maintenance tolerance at 80 000 lb. The accuracy of weighments on the Class III L scale are less reliable if uncertainties in the weighing process are factored into reading indications for a scale with a 20 lb  $e$ . The Class III scale (where  $e = 50$  lb and there is a 100 lb [2 e] allowable error) results in a more appropriate relationship than that of the Class III L scale (where  $e = 20$  lb and there is a 160 lb [8 e] allowable error). It should be noted that the tolerance values, zero-tracking limit, and motion detection requirements in NIST Handbook 44 are roughly equivalent to an R 76 instrument when  $e = 50$  lb.

During the 2005 NCWM Interim Meeting, the Committee agreed the proposal has merit. However, the Committee made the proposal an information item in response to requests from jurisdictions for more time to examine data from test results using the proposed tolerances and to determine if there are devices that cannot comply without the additional 5 d tolerance presently in Table 6.

At present, only NEWMA recommended the proposal move forward for a vote. The WWMA and CWMA recommended the proposal remain an information item until more data is gathered to determine whether or not it creates any problems regarding field equipment or how field officials apply the requirement.

The SMA opposed the proposal based on one member's data that demonstrated it manufactured 6 000 e devices that do not meet the proposed tolerances unless they are given the extra step in tolerance.

The Committee acknowledged this proposal is meant to harmonize U.S. and OIML requirements, yet there is not sufficient feedback on the impact of changing tolerances on existing scales and new equipment. The Committee also considered the concerns of industry and those expressed earlier by field officials indicating a need for the additional tolerance in the fifth step for scales to comply with acceptance tolerance. Consequently, the Committee has withdrawn the proposal from its agenda.

For more background information, refer to the Committee's 2005 Final Report of the 90<sup>th</sup> NCWM Annual Report.

#### **320-6 V T.N.4.5.1. Time Dependence; Class II, III, and IIII Non-automatic Weighing Instruments**

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Modify paragraph T.N.4.5.1. Time Dependence as follows:

**T.N.4.5.1. Time Dependence; Class II, III, and IIII Non-automatic Weighing Instruments.** – A non-automatic weighing instrument of Classes II, III, and IIII shall meet the following requirements at constant test conditions. **During type evaluation, this test shall be conducted at 20 °C only.**

- (a) When any load is kept on an instrument, the difference between the indication obtained immediately after placing the load and the indication observed during the following 30 min shall not exceed 0.5 e.
- (b) However, the difference between the indication obtained at 15 min and that at 30 min shall not exceed 0.2 e. If the conditions in (a) and (b) are not met, the difference between the indication obtained immediately after placing the load on the instrument and the indication observed during the following 4 hours shall not exceed the absolute value of the maximum permissible error at the load applied.
- (c) The deviation on returning to zero as soon as the indication has stabilized after the removal of any load which has remained on the instrument for 30 min, shall not exceed 0.5 e.

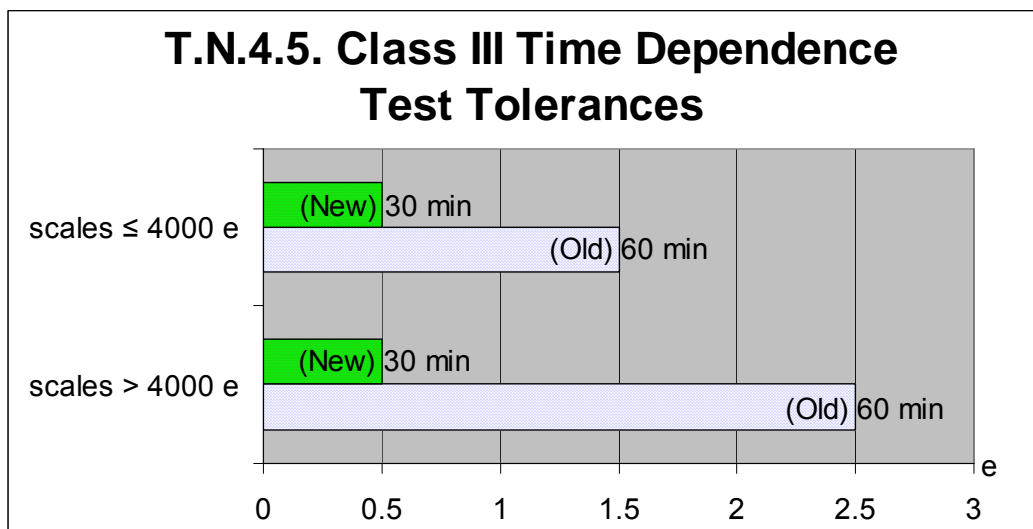
For a multi-interval instrument, the deviation shall not exceed 0.5  $e_1$  (where  $e_1$ , is interval of the first partial weighing range or segment of the scale).

On a multiple range instrument, the deviation on returning to zero from  $Max_i$  (load in the applicable weighing range) shall not exceed 0.5  $e_i$  (interval of the weighing segment). Furthermore, after returning to zero from any load greater than  $Max_1$  (capacity of the first weighing range) and immediately after switching to the lowest weighing range, the indication near zero shall not vary by more than  $e_1$  (interval of the first weighing range) during the following 5 min.

(Added 2005) **(Amended 200X)**

**Discussion:** The proposal is intended to harmonize further the test conditions in U.S. requirements for time dependence tests with procedures included in OIML requirements. OIML requires that factors such as temperature, which might contribute to errors in test results, be kept constant. Consequently, the SWMA proposed to modify paragraph T.N.4.5.1. to specify that a constant temperature of 20 °C must be maintained during laboratory test conditions for type evaluation.

The Committee considered a further modification of paragraph T.N.4.5.1. to include a range of temperatures representative of a typical laboratory environment that is less restrictive than the current proposal. However, the Committee agreed with industry's alternate proposal to add the word "only" to the language to reinforce the need for a constant temperature of 20 °C during type evaluation test conditions. Given the comparison of the new and old tolerances applied to Class III instruments as illustrated in the graph below, it is apparent that sources for error and uncertainty must be controlled or eliminated under the new, more stringent tolerances.



Although the time period required for the test has decreased by half from 60 min to 30 min, the new 0.5 e tolerance (see paragraph T.N.4.5.1.(a)) for the change in the indication while the scale is under load is three to five times more stringent for the 30-min test than it was for the previous 60-min test.

The time dependence test requirements adopted in 2005 included two additional tolerances the instrument must meet. First, the instrument must comply with the 0.2 e tolerance (see paragraph T.N.4.5.1.(b)) that applies to the change of the indication during the last 15 min of the time dependence test or face a lengthier test period. There was no such tolerance prior to 2006. For example, if the scale indication shifted 0.2 e in the first 15 min and shifted another 0.3 e in the last 15 min, the time dependence test would be extended to a four hour test even though the total shift in indications is 0.5 e. Secondly, the instrument must also meet a zero return tolerance of 0.5 e for any load that remains on the scale for 30 min.

The Committee recognized that it is not appropriate for type evaluation tests to be performed where fluctuating temperatures contribute uncertainty to test results. The Committee recommends time dependence test for Class I, II, III, and IIII non-automatic weighing instruments undergoing type evaluation be conducted at only 20 °C. The Committee modified the proposal accordingly as recommended by industry. The Committee did so in keeping with the original intent of the OIML requirement, which is to eliminate the effects of influence factors on the instrument's performance during the time dependence test.

**320-7 V T.N.4.6.(b) Apportionment Factors, Table T.N.4.6. Maximum Permissible Error (mpe)\* for Load Cells During Type Evaluation, T.N.4.7. Creep Recovery for Load Cells During Type Evaluation, and Appendix D; Definitions of Dmin**

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** Modify paragraph T.N.4.6.(b) and Table T.N.4.6. as follows:

**T.N.4.6. Time Dependence (Creep) for Load Cells During Type Evaluation.** – A load cell (force transducer) marked with an accuracy class shall meet the following requirements at constant test conditions:

- (a) **Permissible Variations of Readings.** – With a constant maximum load for the measuring range ( $D_{\max}$ ) between 90 % and 100 % of maximum capacity ( $E_{\max}$ ), applied to the load cell, the difference between the initial reading and any reading obtained during the next 30 min shall not exceed the absolute value of the maximum permissible error (mpe) for the applied load (see Table T.N.4.6.). The difference between the reading obtained at 20 min and the reading obtained at 30 min shall not exceed 0.15 times the absolute value of the mpe (see Table T.N.4.6.).
- (b) **Apportionment Factors.** – The mpe for creep shall be determined from Table T.N.4.6. Maximum Permissible Error (mpe)\* for Load Cells using the following apportionment factors ( $p_{LC}$ ):

$p_{LC} = 0.7$  for load cells marked with S (single load cell applications), ~~and~~  
 $p_{LC} = 1.0$  for load cells marked with M (multiple load cell applications), ~~and~~  
 $p_{LC} = 0.5$  for Class III L load cells marked with S or M  
(Amended 200X)

(Added 2005)

<b>Table T.N.4.6.</b> <b>Maximum Permissible Error (mpe)* for Load Cells</b> <b>During Type Evaluation</b>			
<b>mpe in Load Cell Verifications Divisions (v) = <math>p_{LC}</math> x Basic Tolerance in v</b>			
<b>Class</b>	<b><math>p_{LC} \times 0.5 \text{ v}</math></b>	<b><math>p_{LC} \times 1.0 \text{ v}</math></b>	<b><math>p_{LC} \times 1.5 \text{ v}</math></b>
I	0 - 50 000 v	50 001 v - 200 000 v	200 001 v +
II	0 - 5 000 v	5 001 v - 20 000 v	20 001 v +
III	0 - 500 v	501 v - 2 000 v	2 001 v +
III	0 - 50 v	51 v - 200 v	201 v +
III L	0 - 500 v	501 v - 1 000 v	(Add 0.5 v to the basic tolerance for each additional 500 v or fraction thereof up to a maximum load of 10 000 v)
v represents the load cell verification interval $p_{LC}$ represents the apportionment factors applied to the basic tolerance $p_{LC} = 0.7$ for load cells marked with S (single load cell applications) $p_{LC} = 1.0$ for load cells marked with M (multiple load cell applications) <u><math>p_{LC} = 0.5</math> for Class III L load cells marked with S or M</u> * mpe = $p_{LC} \times$ Basic Tolerance in load cell verifications divisions (v)			

(Table Added 2005) (Amended 2006)

Add new paragraph T.N.4.7. as follows:

**T.N.4.7. Creep Recovery for Load Cells During Type Evaluation.** – **The difference between the initial reading of the minimum load of the measuring range ( $D_{\min}$ ) and the reading after returning to minimum load subsequent to the maximum load ( $E_{\max}$ ) having been applied for 30 min shall not exceed:**

**0.5 times the value of the load cell verification interval (0.5 v) for Class I, II, III, and IIII load cells, or**

**1.5 times the value of the load cell verification interval (1.5 v) for Class III L load cells.**

**(Added 2006)**

Add new definitions of  $D_{\min}$  and  $E_{\min}$  to Appendix D as follows:

**D<sub>min</sub> (minimum load of the measuring range). Smallest value of a quantity (mass) which is applied to a load cell during test or use. This value shall not be less than E<sub>min</sub>. [2.20]**  
**(Added 2006)**

**E<sub>min</sub> (minimum dead load). Smallest value of a quantity (mass) which may be applied to a load cell during test or use without exceeding the mpe. [2.20]**  
**(Added 2006)**

**Discussion:** In 2005 the NIST Handbook 44 Scales Code was modified to include requirements for time dependence tests and to align U.S. requirements and OIML test procedures. Creep recovery test procedures and the appropriate apportionment factor for Class III L load cells were inadvertently omitted from the proposal to modify NIST Handbook 44. This current proposal modifies the test notes to include the necessary procedures and to add corresponding terminology that defines the limits for error permitted during the creep recovery test.

After making several suggested changes to the definitions of **D<sub>min</sub>** and **E<sub>min</sub>** to correctly set minimum limits for each value and hearing no negative input during the 2006 Interim Meeting, the Committee made the proposal a voting item.

#### **320-8 V UR.1.6. Computing Scale Interfaced to a Cash Register**

**Source:** Carryover Item 320-3. (This item originated from the SWMA and first appeared on the Committee's 2005 agenda.)

**Recommendation:** Add a new paragraph UR.1.6. to the Scales Code as follows:

**UR.1.6. Computing Scale Interfaced to a Cash Register. – A computing scale may interface with a cash register provided all displayed and recorded indications agree.**  
**(Added 2006)**

**Discussion:** This proposal creates a new device-specific code requirement to the Scales Code to address the proper interface of computing scales with electronic cash registers (ECRs). Simultaneously, work continues in the SWMA to develop additional language to clarify to the field official how each component must display transaction information, function in taking tare, and operate with Price-Look-Up (PLU) capability. Currently, General Code provisions specifying that weighing and measuring equipment and associated devices shall not facilitate fraud may not be sufficient to clarify how a computing scale interfaced with an ECR should operate.

The proposal was developed in response to reports of computing scales interfaced with ECRs where the ECR accepts weighing results from the computing scale and uses the ECR's price look-up (PLU) feature to retrieve tare and unit price information and calculate the total price. In this instance a different unit price, tare, and total price may already be manually entered and displayed on the computing scale. What customers view on the computing scale as the net weight, unit price, and total price may not be what is actually used by the ECR to calculate the customer's charge. In this example, the devices in commercial use were found out of compliance because the interface was not listed on their NTEP CC as an approved application.

The proposal began as a new specification (rather than a user requirement) with the exact same wording as shown above. It was thought that the language should clarify the acceptability of the ECR and computing scale to communicate the total price, but not to the point where the input process involves the ECR calculating the total price. The Committee recommended that jurisdictions, if they have not already done so, establish clear examination procedures (e.g., enter a new price per pound at the ECR) so that officials also have field examination procedures to verify that an ECR and computing scale interface are in compliance.

The Committee heard numerous comments that the proposed specification would be too restrictive to new technology. Industry believed the proposal written as a specification might limit future technology to interface equipment. Subsequently, industry developed an alternate proposal that stated the ECR and POS indications must agree as shown above in the recommendation. Industry did so because it believes the proposed subparagraphs were too restrictive when a POS system reads UPC codes and recomputes prices for frequent shopper discounted prices. The Committee decided to consider an alternate proposal that only specifies "all indications must agree" since type evaluation already verifies the

requirements proposed in the new paragraph. The Committee believes that if ECR input is part of the criteria for determining that an interface complies, then the language should be expanded to provide more detail to the field official as to how the interface works. The Committee concluded that a requirement is needed to ensure the user properly interfaces the equipment as approved by NTEP and as intended by the manufacturer's design once it is in commercial use. Consequently, the Committee modified the proposal making it a user requirement with the recommendation that it be adopted by the NCWM.

During the 2005 NCWM Annual Meeting, the Committee heard more details as to how a computing scale may be inappropriately interfaced with an ECR to create a POS system contrary to the intended device application covered on the device's CC. The Committee found that neither the earlier design specification or the currently proposed user requirement addressed computing scales with multiple sales accumulation capability. The current definition of a POS was thought to require some modification to clarify the specific type of weighing element permitted as part of the POS assembly. After hearing this information, the Committee questioned whether this issue should be both a design specification and a user requirement. The Committee changed the item status from "voting" to "information" and recommended SWMA rework the proposal to (1) provide more detail to the field official about how the cash register must function, (2) include a corresponding specification in NIST Handbook 44 to assist device manufacturers who are considering design modifications to a computing scale or cash register, and (3) ensure there are no conflicts with requirements in corresponding paragraphs such as S.1.8.4. Recorded Representations, Point-of-Sale Systems.

During the 2006 Interim Meeting, the Committee considered input from the 2005 fall regional weights and measures association meetings. The WWMA recommended withdrawing the item since there is sufficient language in General Code paragraphs G-S.2. Graduations, Indications, and Recorded Representation, G-S.5.2.2. Digital Indication and Representation, and G-UR.1.1. Suitability of Equipment to address the proper interface of a POS with an ECR. NEWMA indicated the item should be withdrawn because it needed further development. SWMA received limited comments on the proposal and decided to take no position on the item. The Committee believes there is a need to alert POS operators about indiscriminately interfacing a POS and ECR. However, until such time as more work can be put into creating more explicit language that is not restrictive to technology and self-explanatory to the field official, the Committee agreed with industry's alternate proposal for a simply stated user requirement that specifies the POS and ECR transaction information must agree.

For more background information, refer to the Committee's 2005 Final Report of the 90<sup>th</sup> NCWM Annual Report.

### **320-9 V UR.2.6.1. Vehicle Scales; Approaches**

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Modify paragraph UR.2.6.1. as follows:

***UR.2.6.1. Vehicle Scales.*** – *On the entrance and exit ends of a vehicle scale installed in any one location for a period of 6 months or more, there shall be a straight approach as follows:*

- (a) the width at least the width of the platform,*
- (b) the length at least one-half the length of the platform but not required to be more than 12 m (40 ft), and*
- (c) not less than 3 m (10 ft) of any approach adjacent to the platform shall be constructed of concrete or similar durable material to ensure that this portion remains smooth and level and in the same plane as the platform. However, grating of sufficient strength to withstand all loads equal to the concentrated load capacity of the scale may be installed in this portion. Any slope in the remaining portion of the approach shall ensure (1) ease of vehicle access, (2) ease for testing purposes, and (3) drainage away from the scale.*

*[Nonretroactive as of 1976]*

**Note:** **This paragraph does not prohibit a vehicle scale with only one end used as the entrance and exit of the scale.**

(Amended 1977, 1983, ~~and~~ 1993 **and 2006**)

**Discussion:** The CWMA proposal was developed to clarify that the wording in paragraph U.R.2.6.1. recognizes installations that have a combination entrance and exit because of space limitations at the installation site. NEWMA did not support the proposal because it believed the current language can be interpreted to permit installations with an approach that is a combination entrance and exit.

NIST WMD cautions that improper exiting may cause excessive wear on the scale that can lead to inaccuracy and increased maintenance. In 1993 paragraph UR.2.6.1. was modified to ensure a good exit path on scales, thus reducing unnecessary wear and tear on the device. The modification to paragraph UR.2.6.1. was not intended to prohibit a scale with a single end used for both entry and exit of the scale and the S&T Committee specifically noted this at the time. The text which originally read “the approach end or ends of a vehicle scale” was modified to read “ the entrance and exit ends of a vehicle scale.” This change promoted a good exit path that met specific requirements for width, length, and durability in construction. Prior to any modification of paragraph UR.2.6.1. the single end of those scales being used for an entrance and exit were already being held to approach requirements.

The Committee agreed that the proposal as worded provided no new information about the requirement and this issue was previously addressed when the requirement was modified in 1993. However, the Committee acknowledged that in the thirteen years since paragraph UR.2.6.1. was last modified there are some jurisdictions prohibiting scales from operating because the requirement was misinterpreted. Consequently, the Committee recommended adding a new note to paragraph UR.2.6.1. to clarify that the requirement does not prohibit use of a single end of the vehicle scale that is properly designed for entering and exiting the scale.

#### **320-10 V UR.3.7. Minimum Load on a Vehicle Scale**

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Modify paragraph UR.3.7.(a) Minimum Load on a Vehicle Scale as follows:

UR.3.7. Minimum Load on a Vehicle Scale. – A vehicle scale shall not be used to weigh net loads smaller than:

- (a) 10 d when weighing scrap material for recycling and for refuse materials at landfills and transfer stations;
- (b) 50 d for all other weighing.

As used in this paragraph, scrap materials for recycling shall be limited to ferrous metals, paper (including cardboard), textiles, plastic, and glass.  
(Amended 1988 ~~and~~ 1992 and 2006)

**Background/Discussion:** SWMA believes the same 10 d minimum load requirement granted in 1992 for the weighing of certain scrap materials and recyclables should apply to refuse hauled to landfills. SWMA found that both types of material are redeemed or disposed of in small quantities and are awkward and sometimes unsafe (long, sharp, protruding edges) to handle and, thus, fall under the earlier rationale that allowed the 10 d minimum load for recyclable materials. Because of the low value of refuse material, SWMA believes it is not profitable for centers to accept those materials nor does it make it feasible for them to purchase a suitable scale. SWMA noted that many municipal landfills accept refuse materials in quantities that are in violation of paragraph UR.3.7., but do so to prevent citizens from improperly disposing of materials. SWMA believes that expanding the 10 d minimum load requirement is sensible and environmentally responsible.

The current minimum load requirement for vehicle scales evolved over a period of seventy years as the weights and measures community began to examine the uncertainties and errors that can occur when weighing small loads on vehicle scales. The history of the requirement is excerpted from the 1987, 1992, and 1995 S&T Final Reports of their respective NCWM Annual Reports. In 1937 a 1 000 lb minimum gross load requirement was adopted for vehicle scales. The focus of the 1937 discussions was the relationship of the minimum tolerance to the gross load with no consideration given to errors that occur as a result of rounding indications to the nearest division.



In 1980 the scale industry discussed proposals for OIML scale requirements that included a minimum load requirement for each accuracy class based on both the applicable scale tolerance and rounding error. In 1984 a recommended minimum load requirement was adopted for scales marked with an accuracy class since weighing of light loads was likely to result in relatively large errors.

In 1987 a minimum net load requirement was addressed. The load weighed on a scale should be sufficiently large so that the resolution of the scale (rounded to the nearest scale division) does not result in an excessively large error as a percentage of the weighed load. This principle is more important since net weight is determined by two weighings where the results are rounded to the nearest division at each weighing, thus the potential error becomes  $\pm 1$  d. In 1988 a minimum net load requirement of 50 d was adopted for vehicle scales.

In 1992 an exemption was granted from the 50 d minimum net load requirement to allow a 10 d minimum net load requirement for scrap material to promote recycling and conservation. Examples of scrap material for recycling for the purpose of the exemption were specifically defined as: ferrous metals, paper (including cardboard), textiles, plastic, and glass typically with low redemption value and difficult to handle thus requiring more labor to offload and further reducing the material's value. The Committee encouraged weights and measures officials and the recycling industry to work together to ensure good business practices were followed to include education and weighing all materials on a suitable scale.

In 1994 the Committee considered a proposal to modify paragraph UR.3.7. to return to a 50 d minimum gross load requirement for all vehicle scales. At that time adequate justification was not heard for returning to a less stringent minimum load requirement. The Committee also heard an alternative proposal to permit a 10 d minimum net load on a vehicle scale for solid wastes disposed of in landfills. The Committee found it self-defeating to adopt a requirement and then continually revisit the requirement further adding to a laundry list of exemptions.

At its October 2005 Interim Meeting, NEWMA supported an alternative proposal which would require a 20 d minimum load for all commodities weighed on a vehicle scale. NEWMA reported that some jurisdictions do not enforce the 50 d minimum load requirement at municipal landfills and other sites because of the low cost of the commodity. NEWMA suggested several points for consideration when there is a 10 d minimum load requirement. First, the price of the commodity should be a factor in deciding the minimum load limit. Additionally, it is also inappropriate to have a 10 d minimum load requirement especially for large-capacity scales where rounding errors may contribute to uncertainties in the measurement.

The Committee was asked to consider that the proposal is not meant to limit the application to "landfills" and should also include materials transported to "refuse transfer stations." These facilities are in use because landfills have reached capacity. Transfer stations accept materials typically not picked up at curbside by municipal waste trucks. Materials are transported from transfer stations to a regional facility. Transfer stations charge town residents a fee based on the vehicle's inbound and outbound weight; however, the net load is usually less than 1000 lb and in violation of paragraph UR.3.7. Conditions similar to those found at recycling centers exist at refuse transfer stations where the environment is dirty and unsafe. Unloading small loads from truck beds and car trunks requires more time and human intervention since equipment such as skip loaders are not practical. Consequently, any fees associated with handling refuse material are higher to recoup handling cost even though weightment occurs on a more suitable 1 000-lb capacity scale. The unfortunate consequence of following a practice that is more labor intensive and involving higher fees is that jurisdictions see an increase in illegal dumping of materials by town residents.

The Committee considered the NCWM Review Panel's recommendations and heard numerous comments on the proposal during the open hearing session. The Review Panel indicated the proposal was not ready for consideration by the Committee since no data was provided to demonstrate the impact of weighing errors occurring nationally at landfills that accept refuse materials. During the open hearing, multiple jurisdictions reported that although officials are aware that landfills are not complying with the minimum load requirements, they have difficulties enforcing the requirement especially on weekends when residents are most likely to use landfills. Some jurisdictions were in favor of a flat rate for loads less than 50 d, but noted that centers use the same scale prohibited for use in weighing light loads to determine when a customer's load should be assessed at the flat rate. One jurisdiction noted that even though a customer is assessed a flat rate, there are environmental regulations that require weighing of that same customer's load so that there is some record of the amount of materials going into landfills. NIST WMD recommended use of a suitable scale to ensure (1) there is sufficient scale resolution to reduce the potential error introduced when rounding weight indications to

the nearest division and (2) the tolerance that applies to the device under test does not represent a significant portion of the smallest net load. The Committee was cautioned about where to set the minimum load limit since wind can affect readings for loads at 20 d. One question that could not be answered was if there is any effort to educate business operators about scale errors and other good weighing practices.

The Committee considered the lengthy history of the requirement as well as comments made during the 2006 Interim Meeting to reach a recommendation on the proposal. The Committee acknowledged past changes to the requirement to address the relationship of tolerances and rounding of indications to light loads and exemptions granted to promote recycling and conservation. The Committee also recognized the reluctance of past committees to further add to a laundry list of exemptions. The Committee believes there is national concern about the difficulties in handling refuse materials and wants to discourage roadside dumping of refuse materials. The proposal does not clarify what materials fall into the category of “refuse” nor does it address instances where some jurisdictions may prohibit disposal of certain materials such as tires. The original language of the proposal exempted the less valuable recyclable materials. The Committee would like to hear if a similar situation may exist where a distinction needs to be made between refuse materials granted the exemption because some jurisdictions indicate that the cost of disposing some refuse material makes these items more valuable than recycling materials. Consequently, after modifying the proposal to include refuse transfer stations, the Committee made the proposal a voting item.









### 320-11 V List of International Symbols Noted as Acceptable





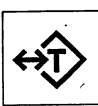
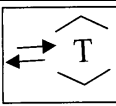












**Source:** Carryover Item 320-9. (This item originated from the Southern Weights and Measures Association (SWMA) and first appeared on the Committee’s 2005 agenda.)

**Recommendation:** Add a new List of Acceptable Abbreviations and Symbols to NIST Handbook 112, Examination Procedure Outlines for Commercial Weighing and Measuring Devices as follows:

#### Appendix to NIST Handbook 112

##### List of Acceptable Abbreviations/Symbols

Device Application	Term/Function	Acceptable Abbreviations/Symbols	Not Acceptable
<b>The following symbols are intended for operator controls, indications, and features. When they are also intended for the customer (including customer-operated devices), they cannot be used without additional descriptions, directions, or marks displayed or marked on the device.</b>			
<b><u>Operational Controls, Indications, Features:</u></b>	<b><u>zero key or center of zero indicator</u></b>		<b><u>“z” alone is not acceptable unless term is defined on device</u></b>
	<b><u>Off (Power)</u></b>		
	<b><u>On (Power)</u></b>		
	<b><u>On/Off (Power)</u></b>		
	<b><u>Print</u></b>		
	<b><u>Weighing</u></b>		
	<b><u>Scale n (n = 1, 2, ...)</u></b>		
	<b><u>Range n (n = 1, 2, ...)</u></b>		

Device Application	Term/Function	Acceptable Abbreviations/Symbols	Not Acceptable
<b>The following symbols are intended for operator controls, indications, and features. When they are also intended for the customer (including customer-operated devices), they cannot be used without additional descriptions, directions, or marks displayed or marked on the device.</b>			
<b><u>Operational Controls, Indications, Features:</u></b>	<b><u>High resolution</u></b>		
	<b><u>enter key</u></b>		
	<b><u>tare enter key</u></b>		
	<b><u>tare clear key</u></b>		
	<b><u>tare enter/tare clear</u></b>		
	<b><u>verify tare</u></b>		
	<b><u>Not for direct sales to the public</u></b>		
	<b><u>Combined zero/tare – See S.2.1.6. for additional information</u></b>		
	<b><u>Taring</u></b>		
	<b><u>Mass/Weight</u></b>		
	<b><u>Money</u></b>		
	<b><u>Price Per weight unit</u></b>		
	<b><u>Piece count</u></b>		
	<b><u>Counter</u></b>		
	<b><u>Read Counter</u></b>		
	<b><u>Print certificate</u></b>		
	<b><u>Information</u></b>		
<b><u>Other symbols used to mark weighing and measuring devices may be approved and included in this list. Frequently used and easily recognizable approved symbols such as \$ (dollar symbol) are not maintained in the list.</u></b>			

(Table Added 2006)

**Discussion:** The list of symbols in the proposal introduces the U.S. weights and measures official to a set of international symbols for use in marking operator controls, indications, and device features. Recognition and use of these symbols are consistent with efforts to harmonize U.S. and international device requirements.

Currently, the list of symbols in the proposal is part of NCWM Publication 14 “Technical Policy, Checklists, and Test Procedures” for Weighing Devices. NTEP uses international symbols whenever possible. Style differences, such as variations in the shape of arrows, are acceptable.

The Committee heard various recommendations for making the symbols readily accessible. The recommendations ranged from posting the list on a weights and measures website to placing the list in NIST Handbook 44 as an appendix.

The Committee agreed with the need to familiarize U.S. officials with international symbols and considered a recommendation for making the list of acceptable new symbols a new Appendix E in NIST Handbook 44. During the 2005 NCWM Annual Meeting, the Committee agreed that unless the table references a specific code, then the table applies to all types of devices. The Committee believes that if the table is to be used as an enforcement tool, then only symbols in the proposed list would be considered acceptable. The Committee preferred an all-inclusive list of acceptable symbols if the list is to appear as part of Handbook 44. If the table is intended to be all-inclusive, other acceptable symbols currently in use for all device types, such as the dollar sign (\$) on retail motor-fuel dispensers and taxi meters, must be added to the list. The Committee changed the status of the item from voting to an information item to allow time to determine how the table could be linked to specific codes and to fully assess whether or not the table should be all-inclusive.

At their fall 2005 meetings, the regional weights and measures associations differed in their positions. The WWMA recommended withdrawing the proposal since the owner’s manual or NCWM Publication 14 can be referenced for symbols and other markings and any device that holds a CC must have approved markings. The CWMA recommended listing the symbols in NIST Handbook 44. NEWMA suggested an alternate title “List of Acceptable Commonly Used Abbreviations/Symbols.”

SMA supported the proposal with the following recommendations: (1) change the table’s title to read, “List of Common International Symbols, (2) make the symbols consistent in size and font, (3) completely eliminate the “Device Application” and “Not Acceptable” columns, one and four respectively, (4) remove the heading “Term” in column two and replace it with the word “Function” and remove the heading “Acceptable” in column three and replace it with the word “Symbol,” and (5) add a note that states there are other approved symbols that are not included in the table.

During the 2006 Interim Meeting, the Committee agreed that the list with several modifications to column headings should be a voting item at the 2006 NCWM Annual Meeting. The Committee changed the column headings to ensure they correctly identify all subject matter listed in a specific section. Consequently, the heading in column two specifies term and function and the heading in column three identifies that section as abbreviations and symbols that are acceptable. The Committee also agreed that the list should be made available as an appendix to the EPOs. The list should also be routinely updated to delete more commonly accepted and recognized symbols. The EPOs are used by field officials during test and inspection of devices to determine the appropriate procedure and code references. The Committee recommended examining up-to-date lists of international symbols such as those published by DIN (Deutsches Institut für Normung e.V.), the German Institute for Standardization, as a source for adding new acceptable symbols to the table.

For more background information, refer to the Committee’s 2005 Final Report of the 90<sup>th</sup> NCWM Annual Report.

## **321 BELT-CONVEYOR SCALE SYSTEMS**

### **321-1 V N.1.1. Official Test, N.4. As-found Inspection and Tests, and UR.4.1. As-found Inspection and Tests**

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** Modify paragraph N.1.1. as follows:

**N.1.1. Official Test.** – ~~A complete official test of a belt-conveyor scale system performed by the official with statutory authority shall be a~~ include N.3.1. Zero Load Test, N.3.2. Materials Test, and if applicable, N.3.3. Simulated Load Tests.  
(Amended 2006)

Add new paragraphs N.4. and UR.4.1. as follows:

**N.4. As-found Inspection and Test.** – The official with statutory authority may inspect the belt-conveyor scale system as found in normal operation without prior written notification from the owner or his agent that certifies the system is in compliance and ready for material testing as required in UR.4. Compliance. During the as-found inspection, the official may conduct zero-load and simulated load tests. The official with statutory authority will require that an official material test be conducted within a time frame established by the official<sup>1</sup>.  
(Added 2006)

<sup>1</sup>The official material test may be scheduled sooner than the normal frequency of testing based upon areas of non-compliance and the condition of the installation during the as-found inspection and tests.

**UR.4.1. As-found Inspection and Tests.** – As a result of the tests and inspections performed according to paragraph N.4. As-found Inspection and Tests, the scale owner and/or his agent shall correct any deficiencies identified by the official prior to the official material test. They may also continue performing scheduled or routine maintenance (e.g., cleaning and checking alignment, pulleys, idlers, etc.) prior to the official material tests provided these activities are documented as part of the operational procedures for the installation. The scale owner and/or his agent shall notify the official with statutory authority when the areas of non-compliance have been corrected and if repairs or adjustments are required or performed due to conveyor or scale equipment damage or failure.  
(Added 2006)

**Discussion:** Most commercial weighing and measuring devices are subject to unannounced inspections by weights and measures officials. However, the nature of the inspection and test described in paragraph N.1.1. usually requires advance scheduling to arrange the logistics for testing the reference scale(s) and, if necessary, procurement of vehicles or railcars to transport the pre-weighed or post-weighed material. This practice provided many owner/users of belt-conveyor scales with an opportunity to inspect, clean, and prepare the systems in advance of the test. The owner/user of the scale is required to notify the official with statutory authority that the scale is ready for test in accordance with paragraph UR.4. Compliance. As a result, the official cannot verify compliance with NIST Handbook 44 General Code paragraph G-UR.4.1. Maintenance of Equipment since the as-found condition and performance of the scale does not represent its as-used condition and performance.

The proposal encourages officials to perform as-found inspections and zero-load and simulated load tests to assess compliance with G-UR.4.1. Maintenance of Equipment rather than relying solely on the inspection conducted during the official material tests. The proposal further encourages scale owners and users to perform and document routine inspections and maintenance of the belt-conveyor scale system if they know they are subject to unannounced inspections. The WWMA modified the proposal before recommending it for consideration by the Committee. The SWMA asked for additional input from parties affected by the proposal before it took a position.

The Committee also considered some additional wording regarding tests conducted during the as-found inspection for proposed new paragraph N.4 from the belt-scale service industry. The alternate language was recommended due to concerns about liability issues that might arise because the current wording in paragraph N.4. implies it is the official who must run the test. However, the Committee did not agree with the recommendation because officials must and do use discretion in their abilities to perform tests based on the design, safety, etc., of systems at each installation.

The Committee acknowledged that officials have the authority to conduct as-found inspections based on General Code paragraph G-UR.2.3. Accessibility for Inspection, Testing, and Sealing Purposes. However, previous committees have gone to great lengths to ensure that adequate provisions are in place to address the proper operation and maintenance of

belt-conveyor scale systems. The Committee made one editorial change to paragraph N.4. to include the word “certifies” to clarify the official does not have to wait for the owner or agent for the system to certify the scale is ready for inspection. The Committee agreed that the proposal provides necessary guidelines about when to test devices that have a significant impact on commerce and yet the timing, logistics, etc., required to conduct an official inspection can become a deterrent to performing official duties. Consequently, the Committee made the proposal a voting item.

### 330 LIQUID-MEASURING DEVICES

#### 330-1 V S.1.2. Units

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify paragraph S.1.2. Units as follows:

**S.1.2. Units.** – A liquid-measuring device shall indicate, and record if the device is equipped to record, its deliveries in liters, gallons, quarts, pints, fluid ounces, or binary-submultiples or decimal subdivisions of the liter or gallon. (Amended 1987, 1994, and 2006)

**Background/Discussion:** Some years ago NTEP issued a CC for a liquid-measuring device that displays its deliveries in fluid ounces. The device currently in use always makes a delivery of 4 fl oz. A jurisdiction would not approve the use of the device stating that those units of measurement are not recognized in paragraph S.1.2. in the LMD code. Noting, however, that because paragraph S.1.2. allows binary submultiples of the liter or gallon, an indication of 1/32 gallon would be acceptable.

At the spring 2005 NTEP Laboratory Meeting, the laboratories agreed that consumers would understand and accept a 4-fluid ounce-unit better than a 1/32-gallon-unit and asked the Measuring Sector to review the proposal shown above.

At their October 2005 meetings, the NTETC Measuring Sector and the SWMA agreed to forward the proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting, the Committee heard no opposition to Item 330-1 and agreed to present the item for a vote at the 2006 NCWM Annual Meeting.

#### 330-2 V S.1.2.3. Value of the Smallest Unit

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify NIST Handbook 44, paragraph S.1.2.3. as follows:

**S.1.2.3. Value of Smallest Unit.** – The value of the smallest unit of indicated delivery, and recorded delivery if the device is equipped to record, shall not exceed the equivalent of:

- (a) 0.5 L (~~1-pt~~ 0.1 gal) on ~~retail~~ devices with a maximum rated flow rate of 750 L/min (200 gal/min) or less.
- (b) 5 L (1 gal) on ~~wholesale~~ devices with a maximum rated flow of more than 750 L/min (200 gal/min).

This requirement does not apply to manually operated devices equipped with stops or stroke-limiting means. (Amended 1983, ~~and~~ 1986, and 2006)

**Background/Discussion:** In 2004 the definition of a “retail device” in NIST Handbook 44 was modified to include all devices used to measure product for the purpose of sale to the end user. At that time the Committee believed all affected parties were aware of the proposal and there was no opposition to the change. The Committee had not considered applications where very large deliveries are made to the end user, typically at high flow rates. After the 2005 edition of the handbook was published and distributed, WMD received a comment from a weights and measures jurisdiction that

routinely tests large meters used to deliver fuel to fishing fleets and other large ocean-going boats. The jurisdiction stated that the average delivery is approximately 300 000 gal and may be as much as 1 million gal. Prior to the revision of the definition of “retail,” the value of the smallest unit of the indicated delivery for these devices was permitted to be 1 gal. Most of these devices have mechanical registers which make it impractical to have a smallest unit of 0.1 gal at the high flow rates used for such large deliveries. Because the fuel is being delivered to the end user, the jurisdiction believes this is a retail delivery. However, with the revisions to the definition of retail device, NIST Handbook 44 now requires a smallest unit of delivery of not more than 0.5 L (1 pint or 0.125 gal) for these devices.

At its October 2005 meeting, the NTETC Measuring Sector developed the proposal above and agreed to forward the proposal to the Committee for consideration. The Measuring Sector believed that, because the maximum flow rate for many applications has increased, 200 gal/min is an appropriate “break point” for determining what the smallest unit of measurement should be. At its October 2005 meeting, the SWMA agreed with the Measuring Sector’s proposal and recommended that the item move forward to the Committee.

At the 2006 NCWM Interim Meeting, it was suggested that the Committee should revisit the discussion on suitability of liquid-measuring devices that was discussed by the NCWM in 1991 through 1993. In these earlier discussions, the NCWM was unable to reach a consensus on any changes to NIST Handbook 44, and the item was withdrawn from the Committee agenda. The Committee was informed that there was interest expressed at the 2005 NTETC Measuring Sector Meeting in developing new criteria addressing suitability as it relates to flow rate, minimum measured quantity (MMQ), and smallest unit of measure for applications using liquid-measuring devices. The Committee encourages the NTETC Measuring Sector to pursue development to suitability requirements for submission to the Committee for consideration. In the meantime, the Committee heard no opposition to Item 330-2 and agreed to present the item for a vote at the 2006 NCWM Annual Meeting.

### **330-3 V Table S.2.2. Categories of Device and Methods of Sealing**

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify Paragraph S.2.2 and Table S.2.2. as follows:

**S.2.2. Provision for Sealing.** – Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment can be made of:

- (a) any measuring ~~ingement or indicating~~ element, or
- (b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries; and
- (c) any metrological parameter that will affect the metrological integrity of the device or system.**

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*Audit trails shall use the format set forth in Table S.2.2.*  
*[Nonretroactive and enforceable as of January 1, 1995]*  
**(Amended 1991, 1993, and 1995, and 2006)**

Table S.2.2. Categories of Device and Methods of Sealing	
Category of Device	Method of Sealing
Category 1: No remote configuration capability.	Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.
<p><del>[Category 2 applies only to devices manufactured prior to January 1, 2005. Devices with remote configuration capability manufactured after that date must meet the sealing requirements outlined in Category 3. Devices without remote configuration capability manufactured after that date must meet the minimum criteria outlined in Category 1.]</del></p> <p>Category 2: Remote configuration capability, but access is controlled by physical hardware.</p> <p>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</p>	<p>[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.]*</p> <p>[*Nonretroactive as of January 1, 1996]</p>
<p>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</p> <p>[Nonretroactive as of January 1, 1995]</p> <p>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</p> <p>[Nonretroactive as of January 1, 2001]</p> <p><b>Nonretroactive as of January 1, 2005, all devices with remote configuration capability must comply with the sealing requirements of Category 3.</b></p>	<p>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1 000 records are required. (<b>Note:</b> Does not require 1 000 changes to be stored for each parameter.)</p>

[Nonretroactive as of January 1, 1995]

(Table Added 1993) (Amended 1995, 1998, and 1999, and 2006)

**Background/Discussion:** At its 1998 Annual Meeting, the NCWM adopted a proposal to eliminate “Category 2” as an option for devices that fall under the sealing requirements for Liquid-Measuring Devices Code and the Mass Flow Meters Code. In 1992 the Committee agreed to add “Category 2” to the acceptable forms of audit trail because an event counter requires significant memory and many device manufacturers wanted to provide remote configuration capability for at least some of the sealable parameters. For this reason a “hybrid” form of audit trail was established. The restricted access to the hardware that inhibits and activates the remote configuration capability eliminated the need for the complete form of the event logger for this category. Effective January 1, 2005, all devices falling under these two codes must be designed as a Category 1 device or, if equipped with remote configuration capability, must be a Category 3 device.

At its October 2005 meeting, the NTETC Measuring Sector discussed the elimination of “Category 2” as well as the NIST Handbook 44 codes, such as the Vehicle-tank Meters Code or the LPG and Anhydrous Ammonia Liquid-Measuring Devices, for liquid-measuring devices that do not have specific provisions for electronic security (i.e., audit trails). At the meeting, manufacturers of these devices stated that they have designed metering systems with electronic security with remote configuration capability. They are currently seeking an NTEP CC for these systems. Currently the specific NIST Handbook 44 code for these devices does not address electronic sealing; however, electronic sealing is



recognized in the General Code and under the provisions of G-A.3. Special and Unclassified Equipment. The specific audit trail criteria in the LMD Code can be applied, as appropriate. The manufacturers would prefer that each code include specific language similar to that in the LMD Code. During the discussion, the Sector concluded that some of these new applications and other applications currently in use would have been classified as the former “Category 2” devices. Some NTEP CCs have been issued stating that the device evaluated was a Category 1 device; however, because the mechanism for accessing sealable configuration parameters is not a permanent part of the device and can be removed without affecting normal operation, the device actually meets the definition of remote configuration capability. The manufacturers of these devices believe that no problems have been reported due to their current method of sealing and that it is inappropriate to require them to change the method of sealing to comply with Category 3. The Sector agreed that the decision to remove “Category 2” from the LMD Code and the Mass-flow Meters Code, which may have been based on an incorrect interpretation of remote configuration capability should be reversed and that provisions for electronic sealing should be added to all appropriate liquid-measuring device codes as proposed in Items 330-3, 331-2, 332-1, 334-1, 335-1, 337-1, and 338-1. The Sector agreed to forward that proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting, two jurisdictions suggested that the requirements for audit trails provided in Table S.2.2. could be placed in the General Code. Several meter manufacturers stated concerns that if moving the table to the General Code would delay the proposal to recognize “Category 2” devices for liquid-measuring devices they would prefer to have Item 330-3 move forward as presented. The Committee was concerned that moving the requirements, as shown above, to the General Code could cause a conflict with other device specific codes, such as the Belt-Conveyor Scale Systems Code, that do not recognize “Category 2” devices. The Committee also heard that paragraph S.2.2. should be modified to include changes to metrologically significant configuration parameters as a sealable feature. The Committee agreed to modify paragraph S.2.2. as shown above and to present Item 330-3 for a vote at the 2006 NCWM Annual Meeting.

#### **330-4 V S.3.1. Diversion of Measured Liquid**

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Amend Paragraph S.3.1. as follows:

#### **S.3. Discharge Lines and Valves.**

**S.3.1. Diversion of Measured Liquid.** - No means shall be provided by which any measured liquid can be diverted from the measuring chamber of the meter or its discharge line. Two or more delivery outlets may be installed only if automatic means are provided to ensure that:

- (a) liquid can flow from only one outlet at a time, and
- (b) the direction of flow for which the mechanism may be set at any time is clearly and conspicuously indicated.

~~An manually controlled~~ outlet that may be opened for purging or draining the measuring system or for recirculating, if recirculation is required in order to maintain the product in a deliverable state, suspension shall be permitted ~~only when the system is measuring food products or agri-chemicals~~. Effective means shall be provided to prevent passage of liquid through any such outlet during normal operation of the measuring system and to inhibit meter indications (or advancement of indications) and recorded representations while the outlet is in operation.

(Amended 1991, 1995, ~~and~~ 1996 and 2006)

**Background/Discussion:** The CWMA noted that the requirements in paragraph S.3.1. of Section 3.30 Liquid Measuring Devices and paragraph S.4.1. Diversion of Measured Product of Section 3.37. Mass Flow Meters of NIST Handbook 44 (2005 edition) are not consistent with each other. Paragraph S.3.1. bans manual valves for recirculating product or purging or draining the measuring system except for foods and agri-chemicals. Paragraph S.4.1. allows manual valves but appears to ban automatic valves by omission, and it makes no distinction for types of products measured as long as the system meets the specified requirements.

Cold weather and physical characteristics make recirculation necessary for a number of products not currently recognized in paragraph S.3.1. of Section 3.30.; for example, #6 Fuel oil and B100 Biodiesel. Although liquid-measuring devices exist which have NTEP CCs for these high viscosity products, the current wording of Handbook 44 restricts vendors of these products to using mass flow technology if they wish to recirculate their product in order to keep it in a deliverable state. This appears to be the unintended result of the fact that the two codes were written at different times with different input from industry lobbies. The CWMA recommended that retailers of these products not be restricted to using only mass flow meters for commercial measurements if other suitable technologies are available. Likewise, both manual and automatic valves are suitable for recirculating products in discharge lines of these devices, and the use of either type should be allowed.

At the CWMA 2005 Interim Meeting, it was noted that adopting this proposal would create a logical and consistent standard of enforcement for mass flow meters and liquid-measuring devices, which are used for identical applications and products, thus ending an unintentional bias in favor of one technology over the other.

By stating the uniform guidelines for when it is acceptable to allow purge lines and recirculation lines (i.e., the necessity for such lines to keep the product in a deliverable state), this proposal would eliminate the need for industry to petition the NCWM for each product which requires such special handling. The CWMA agreed to forward the proposal with the recommendation that it be a voting item on the Committee's 2006 agenda.

At the 2006 NCWM Interim Meeting, the Committee heard no opposition to Item 330-4 and agreed to present the item for a vote at the 2006 NCWM Annual Meeting. (See also S&T Item 337-2.)

**330-5 V Table T.2. Accuracy Classes for Liquid Measuring Devices Covered in NIST Handbook 44  
Section 3.30**

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify Table T.2. as follows:

**Table T.2. Accuracy Classes for Liquid Measuring Devices Covered in  
NIST Handbook 44 Section 3.30**

Accuracy Class	Application	Acceptance Tolerance	Maintenance Tolerance	Special Test Tolerance <sup>1</sup>
0.3	Petroleum products delivered from large capacity (flow rates over 115 L/min (30 gal/min))** devices including motor fuel devices, heated products at or greater than 50° C asphalt at or below temperatures 50° C, all other liquids not shown where the typical delivery is over 200 L (50 gal)	0.2 %	0.3 %	0.5 %
0.3A	Asphalt at temperatures greater than 50° C	0.3 %	0.3 %	0.5 %
0.5*	Petroleum products delivered from small capacity (at 4 L/min (1 gal/min) through 115 L/min (30 gal/min))** motor-fuel devices, agri-chemical liquids, and all other applications not shown where the typical delivery is # 200 L (50 gal)	0.3 %	0.5 %	0.5 %
1.1	Petroleum products and other normal liquids from devices with flow rates** less than 1 gal/min and devices designed to deliver less than 1 gal	0.75 %	1.0 %	1.25 %

\*For ~~5 gallon and 10 gallon~~ test drafts  $\leq 10$  gal, the tolerances specified for Accuracy Class 0.5 in the table above do not apply. For these test drafts ~~(a) the maintenance tolerances on normal and special tests for 5 gallon and 10 gallon test drafts shall be 1 in<sup>3</sup> plus 1 in<sup>3</sup> per indicated gal are 6 cubic inches and 11 cubic inches, respectively.~~ ~~(b) Acceptance tolerances on normal and special tests shall be 1/2 in<sup>3</sup> plus 1/2 in<sup>3</sup> per indicated gallon are 3 cubic inches and 5.5 cubic inches.~~ <sup>1</sup> **Special Test Tolerances are not applicable to retail motor-fuel dispensers.**  
 \*\* Flow rate refers to designed or marked maximum flow rate.

(Added 2002)(Amended 2006)

**Background/Discussion:** Prior to the addition of Table T.2. “Accuracy Classes for Liquid-Measuring Devices Covered in NIST Handbook 44 Section 3.30” in the LMD Code of NIST Handbook 44 in 2002, the applicable tolerances in T.2.1. Tolerance Values for “retail devices” of any flow rate, including RMFDs, were the same for normal and special tests. Special test tolerances were only applicable to “wholesale devices” measuring liquids other than agri-chemicals and asphalt.

At its October 2005 meeting, the NTETC Measuring Sector reviewed a proposal that would remove the special test tolerance for RMFDs and wholesale meters measuring agri-chemicals and asphalt. The Sector agreed that some devices measuring agri-chemicals and asphalt should have a special test tolerance. The current definition of “retail” in Handbook 44 now applies to devices that, prior to 2004 when the definition of “retail” was changed, would have met the definition for a wholesale device with regard to flow rate. When the devices measuring agri-chemicals and asphalt were classified as “wholesale,” they were permitted to have a special test tolerance during type evaluation. Those same devices may now be classified as “retail” because the product is being sold to an end user; however they should still be allowed to have a special test tolerance because of the accuracy limitations of the devices at different flow rates for these specialized products. The Sector agreed to limit the proposal to only RMFDs and to forward the proposal to the Committee for consideration. At its October 2005 Annual Meeting, the SWMA agreed with the Measuring Sector that special test tolerances should not be applicable to RMFDs of any flow rate.

At the 2006 NCWM Interim Meeting, the Committee heard that repeating the exemption for RMFDs in the two parenthetical statements in footnote \*, as presented in the 2006 edition of Publication 15, conflicts with the intent of the language. The original intent of this footnote was to specify tolerance for 5 gal and 10 gal test drafts that was different than those listed in the table for accuracy class 0.5 devices because of the uncertainty limitations on the test methods and standards used in these tests. The Committee also heard that footnote \* should be modified to include other test draft

sizes between 1 gallon and 10 gallons. Some jurisdictions are making undercover test purchases at other than 5-gallon and 10-gallon test draft sizes. The Committee agreed with both comments and modified Table T.2. as shown above. The Committee agreed to present Item 330-5 for a vote at the 2006 NCWM Annual Meeting.

### 331 VEHICLE-TANK METERS

#### 331-1 V S.1.1.3. Value of Smallest Unit

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify Paragraph S.1.1.3. as follows:

**S.1.1.3. Value of Smallest Unit.** - The value of the smallest unit of indicated delivery, and recorded delivery if the meter is equipped to record, shall not exceed the equivalent of:

- (a) 0.5 L (0.1 gal) or 0.5 kg (1 lb) on milk-metering systems,
- (b) 0.5 L (0.1 gal) on meters with a rated maximum flow rate of ~~500~~ 750 L/min (~~100~~ 200 gal/min) or less used for ~~retail~~ deliveries of liquid ~~fuel~~ commodities, or  
(Amended 200X)
- (c) 5 L (1 gal) on meters with a rated maximum flow of 575 L/min (150 gal/min) or more used for jet fuel aviation refueling systems,  
(Added 200X)
- (ed) 5 L (1 gal) on other meters.

**Discussion/Background:** Paragraph S.1.1.3. in the VTM Code requires the smallest unit of indicated delivery to be not greater than 0.5 L (0.1 gal) for deliveries on meters with a rated maximum flow rate of 500 L/min (100 gal/min) or less used for retail deliveries of liquid fuel and 5 L (1 gal) for all other meters (except milk-metering systems). VTMs with rated maximum flow rates up to approximately 150 gal/min are being introduced into the marketplace for use in making deliveries of approximately the same amount as those previously made with devices that had maximum flow rates of 100 gal/min or less. The amount of the increase in flow rate and the amount of product being delivered do not warrant a tenfold increase in the required value of the smallest unit of measurement.

At its 2005 meeting, the NTETC Measuring Sector reviewed a proposal to increase the rated maximum flow rate criteria in paragraph S.1.1.3. from 100 gal/min to 200 gal/min. Some manufacturers of aviation refueling systems suggested that these systems need a separate criterion due to the unique nature of their application. The Sector agreed with the aviation refueler manufacturers and agreed to forward the proposal to the Committee for consideration. At its October 2005 meeting, the SWMA supported the Measuring Sector's proposal and recommended the item move forward to the Committee.

After hearing comments at the 2006 NCWM Interim Meeting, the Committee agreed that paragraph S.1.1.3. (b) should be applicable to commodities other than fuel, such as oil or dry cleaning solvents, that are delivered through a vehicle-tank meter. The Committee agreed to modify paragraph S.1.1.3. (b) as shown above and to present Item 331-1 for a vote at the 2006 NCWM Annual Meeting.

#### 331-2 V S.2.2. Provision for Sealing and Table S.2.2. Categories of Device and Methods of Sealing

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify paragraph S.2.2., delete paragraph S.2.2.1., and add a new Table S.2.2. Categories of Device and Methods of Sealing as follows:

**S.2.2. Provision for Sealing.** – ~~Except on devices for metering milk, a~~Adequate provision shall be made for ~~applying security seals in such a manner that no~~ an approved means of security (e.g., data change audit trail)

or for physically applying a security seal in such a manner that requires the security seal to be broken before a change or an adjustment may be made of:

- (a) any measuring ~~ingement~~ or indicating element, ~~or and~~
- (b) any adjustable element for controlling delivery rate, when such rate tends to affect the accuracy of deliveries, and
- (c) any metrological parameter that will affect the metrological integrity of the device or system.

~~S.2.2.1. Milk Metering Systems. Adequate provision shall be made for applying security seals to the adjustment mechanism and the register. The adjusting mechanism shall be readily accessible for purposes of affixing a security seal.~~

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

Audit trails shall use the format set forth in Table S.2.2.

[Nonretroactive as of January 1, 1995]

(Amended 2006)

<u>Table S.2.2. Categories of Device and Methods of Sealing</u>	
<u>Category of Device</u>	<u>Method of Sealing</u>
<u>Category 1: No remote configuration capability.</u>	<u>Seal by physical seal or 2 event counters: 1 for calibration parameters and 1 for configuration parameters.</u>
<u>Category 2: Remote configuration capability, but access is controlled by physical hardware.</u>  <u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u>	<u>[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.]</u>
<u>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</u>  <u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u>	<u>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1000 records are required. (Note: Does not require 1000 changes to be stored for each parameter.)</u>

[Nonretroactive as of January 1, 1995]

(Table Added 2006)

**Background/Discussion:** At its October 2005 meeting, the NTETC Measuring Sector discussed the elimination of “Category 2” as well as the NIST Handbook 44 codes for liquid-measuring devices, for example, the Vehicle-tank Meters Code or the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code, that do not have specific provisions for electronic security (i.e., audit trails). At the meeting, manufacturers of these devices stated that they have designed metering systems with electronic security with remote configuration capability. They are currently seeking an NTEP CC for these systems. Currently the specific NIST Handbook 44 code for these devices does not address electronic sealing; however, electronic sealing is recognized in the General Code and under the provisions of G-A.3. Special and Unclassified Equipment, the specific audit trail criteria in the LMD Code can be applied, as appropriate. The manufacturers would prefer that each code include specific language similar to that in the LMD Code. During the discussion, the Sector concluded that some of these new applications and other applications currently in use would have been classified as the former “Category 2” of devices. Some NTEP CCs have been issued stating that the device evaluated was a Category 1 device; however, because the mechanism for accessing sealable configuration parameters is not a permanent part of the device and can be removed without affecting normal operation, the device actually meets the definition of remote configuration capability. The manufacturers of these devices believe that no problems have been reported due to their current method of sealing and that it is inappropriate to require them to change the method of sealing to comply with Category 3. The Sector agreed that the decision to remove “Category 2” from the LMD Code and the Mass-flow Meters Code, which may have been based on an incorrect interpretation of remote configuration capability should be reversed and that provisions for electronic sealing should be added to all appropriate liquid-measuring device codes as proposed in Items 330-3, 331-2, 332-1, 334-1, 335-1, 337-1, and 338-1. The Sector agreed to forward that proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting, the Committee agreed that a non-retroactive date of 1995, which is the same as the non-retroactive date in the LMD Code, is appropriate because that date would have been applied to any devices NTEP evaluated using the criteria in G-A.3. Special and Unclassified Equipment. The Committee agreed to present Item 331-2 as shown above for a vote at the 2006 NCWM Annual Meeting. For additional discussion on this item see Item 330-3.

### **331-3 I Temperature Compensation**

**Source:** Carryover Item 331-1 (This item originated from the Western Weights and Measures Association (WWMA) and first appeared on the Committee’s 2000 agenda.)

**Discussion/Background:** The Committee is considering a proposal to modify Section 3.31. Vehicle-Tank Meters (VTM) Code by adding the following new paragraphs to recognize temperature compensation as follows:

#### **S.2.4. Automatic Temperature Compensation for Refined Petroleum Products.**

**S.2.4.1. Automatic Temperature Compensation for Refined Petroleum Products. - A device may be equipped with an automatic means for adjusting the indication and registration of the measured volume of product to the volume at 15 °C (60 °F), where not prohibited by State Law.**

**S.2.4.2. Provision for Deactivating. - On a device equipped with an automatic temperature-compensating mechanism that will indicate or record only in terms of liters (gallons) compensated to 15 °C (60 °F), provision shall be made for deactivating the automatic temperature-compensating mechanism so that the meter can indicate and record, if it is equipped to record, in terms of the uncompensated volume.**

**S.2.4.3. Gross and Net Indications. - A device equipped with automatic temperature compensation shall indicate and record, if equipped to record, both the gross (uncompensated) and net (compensated) volume for testing purposes. If both values cannot be displayed or recorded for the same test draft, means shall be provided to select either the gross or net indication for each test draft.**

**S.2.4.4. Provision for Sealing Automatic Temperature-Compensating Systems. - Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that an automatic temperature-compensating system cannot be disconnected and that no adjustment may be made to the system.**

S.2.4.5. Temperature Determination with Automatic Temperature Compensation. - For test purposes, means shall be provided (e.g., thermometer well) to determine the temperature of the liquid either:

- (a) in the liquid chamber of the meter, or
  - (b) immediately adjacent to the meter in the meter inlet or discharge line.
- (Added 200X)

S.5.6. Temperature Compensation for Refined Petroleum Products. - If a device is equipped with an automatic temperature compensator, the primary indicating elements, recording elements, and recording representation shall be clearly and conspicuously marked to show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).

(Added 200X)

N.4.1.3. Automatic Temperature-Compensating Systems for Refined Petroleum Products. - On devices equipped with automatic temperature-compensating systems, normal tests shall be conducted:

- (a) by comparing the compensated volume indicated or recorded to the actual delivered volume corrected to 15 °C (60 °F); and
- (b) with the temperature-compensating system deactivated, comparing the uncompensated volume indicated or recorded to the actual delivered volume.

The first test shall be performed with the automatic temperature-compensating system operating in the "as-found" condition. On devices that indicate or record both the compensated and uncompensated volume for each delivery, the tests in (a) and (b) may be performed as a single test.

(Added 200X)

N.5. Temperature Correction for Refined Petroleum Products. - Corrections shall be made for any changes in volume resulting from the differences in liquid temperatures between the time of passage through the meter and time of volumetric determination in the prover. When adjustments are necessary, appropriate petroleum measurement tables should be used.

(Added 200X)

T.2.1. Automatic Temperature-Compensating Systems. - The difference between the meter error (expressed as a percentage) for results determined with and without the automatic temperature-compensating system activated shall not exceed:

- (a) 0.4 % for mechanical automatic temperature-compensating systems; and
- (b) 0.2 % for electronic automatic temperature-compensating systems.

The delivered quantities for each test shall be approximately the same size. The results of each test shall be within the applicable acceptance or maintenance tolerance.

(Added 200X)

UR.2.5. Temperature Compensation for Refined Petroleum Products.

UR.2.5.1. Automatic.

UR.2.5.1.1. When to be Used. - In a state that does not prohibit, by law or regulation, the sale of temperature-compensated product, a device equipped with an operable automatic temperature compensator shall be connected, operable, and in use at all times. An electronic or mechanical automatic temperature-compensating system may not be removed, nor may a compensated device be replaced with an uncompensated device, without the written approval of the responsible weights and measures jurisdiction.

**[Note: This requirement does not specify the method of sale for products measured through a meter.]**

**UR.2.5.1.2. Invoices. - An invoice based on a reading of a device that is equipped with an automatic temperature compensator shall show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).**

**(Added 200X)**

When this item was originally submitted, several officials reportedly were confused about the specific applications of a meter covered by an NTEP CC that included the temperature-compensation feature. The WWMA acknowledged some jurisdictions permit temperature-compensated deliveries in applications that are not addressed by NIST Handbook 44. Some states do not allow the use of automatic temperature compensation for the delivery of products using a VTM. At the 2002, 2003, and 2004 NCWM Annual Meetings, this proposal did not achieve a majority vote to pass or fail and was, therefore, returned to the Committee for further consideration.

At the 2005 NCWM Interim Meeting, the Committee participated in a combined open hearing with the NCWM L&R Committee for discussion of this item, which is a device requirement, and L&R Item 232-1 Temperature Compensation for Petroleum Products, which is separate proposal for a corresponding method of sale regulation. A special forum was also held on the first day of the Interim Meeting to discuss temperature compensation issues. However, the Committee was informed that the L&R Committee kept its Item 232-1 as a developing item. The L&R Committee considered splitting Item 232-1 to address separately the method of sale for meter types other than VTM's. However, the L&R Committee decided not to split the item and instead modified Item 232-1 to allow temperature compensation for the sale of petroleum products, other than LPG and petroleum products sold through retail motor-fuel devices, and changed the status of the item to a "Developing" issue. At the forum and the open hearings, the Committee received little or no new information on this item and considered withdrawing it from its agenda. However, because the L&R Committee continues to have a related item on its agenda, the Committee agreed to leave Item 331-3 on its agenda as an information item.

During the 2005 NCWM Annual Meeting, a manufacturer stated that the number of requests for retail motor-fuel dispensers with temperature compensation capability is increasing. The Committee agreed to maintain this item on its agenda until L&R Item 232-1 is further developed.

At its September 2005 Interim Meeting, the CWMA agreed on the technical merit of the proposal and agreed that requirements are needed in NIST Handbook 44; however, the CWMA agreed this is also a "method of sale" issue and the proposal should be retained as an information item until an accompanying method of sale requirement is added to NIST Handbook 130.

At its September 2005 meeting, the WWMA reaffirmed its strong support of this proposal and recommended this item go forward for adoption by the NCWM.

At its October 2005 meeting, NEWMA recommended withdrawing this item. NEWMA feels there is not enough support for this item and that, if it went for a vote again in July, it would still not pass.

At the 2006 NCWM Interim Meeting, the Committee agreed to leave Item 331-3 on its agenda as an information item because the L&R Committee is closer to developing a corresponding method of sale requirement that is acceptable to most jurisdictions on its agenda. The Committee encourages the weights and measures community to review the newly modified L&R Item 232-1 based on work at the 2005 fall meetings of the regional weights and measures associations. (See L&R Agenda Item 323-1 which is presented as an information item.)

For additional background on this item, see the Committee's 2000 through 2005 Final Reports of their respective NCWM Annual Reports.



### 332 LIQUEFIED PETROLEUM GAS AND ANHYDROUS AMMONIA LIQUID-MEASURING DEVICES

#### 332-1 V S.2.2. Provision for Sealing and Table S.2.2. Categories of Device and Methods of Sealing

**Source:** National Type Evaluation Technical Committee (NTEC) Measuring Sector.

**Recommendation:** Modify paragraph S.2.2. and add a new Table S.2.2. as follows:

**S.2.2. Provision for Sealing.** - Adequate provision shall be made for ~~applying security seals in such a manner that no~~ an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment may be made of:

- (a) any measuring ~~ingement~~ or indicating element, ~~and or~~
- (b) any adjustable element for controlling delivery rate, when such rate tends to affect the accuracy of deliveries, and
- (c) any metrological parameter that will affect the metrological integrity of the device or system.

When applicable, ~~T~~the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

Audit trails shall use the format set forth in Table S.2.2.

[Nonretroactive as of January 1, 1995]

(Amended 2006)

<b><u>Table S.2.2. Categories of Device and Methods of Sealing</u></b>	
<b><u>Category of Device</u></b>	<b><u>Method of Sealing</u></b>
<b><u>Category 1: No remote configuration capability.</u></b>	<b><u>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</u></b>
<b><u>Category 2: Remote configuration capability, but access is controlled by physical hardware.</u></b>  <b><u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u></b>	<b><u>[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.]</u></b>
<b><u>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</u></b>  <b><u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u></b>	<b><u>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1 000 records are required. (Note: Does not require 1 000 changes to be stored for each parameter.)</u></b>

**[Nonretroactive as of January 1, 1995]**  
**(Table Added 2006)**

**Background/Discussion:** At its October 2005 meeting, the NTETC Measuring Sector discussed the elimination of “Category 2” as well as the NIST Handbook 44 codes for liquid-measuring devices, for example, the Vehicle-tank Meters Code or the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code, that do not have specific provisions for electronic security (i.e., audit trails). At the meeting, manufacturers of these devices stated that they have designed metering systems with electronic security with remote configuration capability. They are currently seeking an NTEP CC for these systems. Currently the specific NIST Handbook 44 code for these devices does not address electronic sealing; however, electronic sealing is recognized in the General Code and under the provisions of G-A.3. Special and Unclassified Equipment, the specific audit trail criteria in the LMD Code can be applied, as appropriate. The manufacturers would prefer that each code include specific language similar to that in the LMD Code. During the discussion, the Sector concluded that some of these new applications and other applications currently in use would have been classified as the former “Category 2” devices. Some NTEP CCs have been issued stating that the device evaluated was a Category 1 device; however, because the mechanism for accessing sealable configuration parameters is not a permanent part of the device and can be removed without affecting normal operation, the device actually meets the definition of remote configuration capability. The manufacturers of these devices believe that no problems have been reported due to their current method of sealing and that it is in appropriate to require them to change the method of sealing to comply with Category 3. The Sector agreed that the decision to remove “Category 2” from the LMD Code and the Mass-flow Meters Code, which may have been based on an incorrect interpretation of remote configuration capability should be reversed and that provisions for electronic sealing should be added to all appropriate liquid-measuring device codes as proposed in Items 330-3, 331-2, 332-1, 334-1, 335-1, 337-1, and 338-1. The Sector agreed to forward that proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting, the Committee agreed that a non-retroactive date of 1995, which is the same as the non-retroactive date in the LMD Code, is appropriate because that date would have been applied to any devices NTEP evaluated using the criteria in G-A.3. Special and Unclassified Equipment. The Committee agreed to present Item 331-2 as shown above for a vote at the 2006 NCWM Annual Meeting. For additional discussion on this item see Item 330-3.

### 332-2 V S.4.3. Location of Marking Information; Retail Motor-Fuel Dispensers

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Add a new paragraph S.4.3. and renumber subsequent paragraphs as follows:

**S.4.3. Location of Marking Information; Retail Motor-Fuel Dispensers. - The required marking information in the General Code, Paragraph G-S.1. Identification shall appear as follows:**

- (a) within 60 cm (24 in) to 150 cm (60 in) from the base of the dispenser;
- (b) either internally and/or externally provided the information is permanent and easily read; and
- (c) on a portion of the device that cannot be readily removed or interchanged (i.e., not on a service access panel).

**Note: The use of a dispenser key or tool to access internal marking information is permitted for retail liquid-measuring devices.**

**[Nonretroactive as of January 1, 2003]**

**(Added 2006)**

**S.4.34. Temperature Compensation.** - If a device is equipped with an automatic temperature compensator, the primary indicating elements, recording elements, and recorded representation shall be clearly and conspicuously marked to show that the volume delivered has been adjusted to the volume at 15 °C (60 °F).

**Background/Discussion:** At the spring 2005 NTEP laboratory meeting it was recommended that the location of markings requirement from the LMD code be added to Sections 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices and 3.37. Mass Flow Meters. Both codes have other requirements for retail motor-fuel dispensers similar to those in the liquid-measuring devices code. The laboratories agreed to forward its proposal to the NTETC Measuring Sector for consideration.

At their October 2005 meetings, the NTETC Measuring Sector and the SWMA reviewed the proposal and both agreed to forward the proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting the Committee heard no comments on Item 332-2 and agreed to present it for a vote at the 2006 NCWM Annual Meeting.

## 334 CRYOGENIC LIQUID-MEASURING DEVICES

### 334-1 V S.2.5. Provision for Sealing and Table S.2.5. Categories of Device and Methods of Sealing

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify paragraph S.2.5. and add a new Table S.2.5. as follows:

**S.2.5. Provision for Sealing.** - Adequate provision shall be made for ~~applying security seals in such a manner that no~~ an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of:

- (a) any measuring~~ingement~~ element or indicating element,
- (b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries, ~~and~~
- (c) any automatic temperature or density compensating system, ~~and~~
- (d) any metrological parameter that will affect the metrological integrity of the device or system.**

**When applicable** ~~A~~any adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

*Audit trails shall use the format set forth in Table S.2.5.*

*[Nonretroactive as of January 1, 1995]*

*(Amended 2006)*

<b><u>Table S.2.5. Categories of Device and Methods of Sealing</u></b>	
<b><u>Category of Device</u></b>	<b><u>Method of Sealing</u></b>
<b><u>Category 1: No remote configuration capability.</u></b>	<b><u>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</u></b>
<b><u>Category 2: Remote configuration capability, but access is controlled by physical hardware.</u></b>  <b><u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u></b>	<b><u>[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.]</u></b>
<b><u>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</u></b>  <b><u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u></b>	<b><u>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1 000 records are required. (Note: Does not require 1 000 changes to be stored for each parameter.)</u></b>

*[Nonretroactive as of January 1, 1995]*

*(Table Added 2006)*

**Background/Discussion:** At its October 2005 meeting, the NTETC Measuring Sector discussed the elimination of “Category 2” as well as the NIST Handbook 44 codes for liquid-measuring devices, for example, the Vehicle-tank Meters Code or the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code, that do not have specific provisions for electronic security (i.e., audit trails). At the meeting, manufacturers of these devices stated that they have designed metering systems with electronic security with remote configuration capability. They are currently seeking an NTEP CC

for these systems. Currently the specific NIST Handbook 44 code for these devices does not address electronic sealing; however, electronic sealing is recognized in the General Code and under the provisions of G-A.3. Special and Unclassified Equipment, the specific audit trail criteria in the LMD Code can be applied, as appropriate. The manufacturers would prefer that each code include specific language similar to that in the LMD Code. During the discussion, the Sector concluded that some of these new applications and other applications currently in use would have been classified as the former “Category 2” of devices. Some NTEP CCs have been issued stating that the device evaluated was a Category 1 device; however, because the mechanism for accessing sealable configuration parameters is not a permanent part of the device and can be removed without affecting normal operation, the device actually meets the definition of remote configuration capability. The manufacturers of these devices believe that no problems have been reported due to their current method of sealing and that it is inappropriate to require them to change the method of sealing to comply with Category 3. The Sector agreed that the decision to remove “Category 2” from the LMD Code and the Mass-flow Meters Code, which may have been based on an incorrect interpretation of remote configuration capability should be reversed and that provisions for electronic sealing should be added to all appropriate liquid-measuring device codes as proposed in Items 330-3, 331-2, 332-1, 334-1, 335-1, 337-1, and 338-1. The Sector agreed to forward that proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting, the Committee agreed that a non-retroactive date of 1995, which is the same as the non-retroactive date in the LMD Code, is appropriate because that date would have been applied to any devices NTEP evaluated using the criteria in G-A.3. Special and Unclassified Equipment. The Committee agreed to present Item 331-2 as shown above for a vote at the 2006 NCWM Annual Meeting. For additional discussion on this item see Item 330-3.

### 335 MILK METERS

#### 335-1 V S.2.3. Provision for Sealing and Table S.2.3. Categories of Device and Methods of Sealing

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify S.2.3. and add new Table S.2.3. as follows:

**S.2.3. Provision for Sealing.** - Adequate provision shall be made for ~~applying security seals to the adjustment mechanism and the register.~~ **an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment may be made of:**

**(a) any measuring element or indicating element,**

**(b) any adjustable element for controlling delivery rate, when such rate tends to affect the accuracy of deliveries, and**

**(c) any metrological parameter that will affect the metrological integrity of the device or system.**

**When applicable the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.**

**Audit trails shall use the format set forth in Table S.2.3.**

**[Nonretroactive as of January 1, 1995]**

**(Amended 2006)**

<b><u>Table S.2.3. Categories of Device and Methods of Sealing</u></b>	
<b><u>Category of Device</u></b>	<b><u>Method of Sealing</u></b>
<b><u>Category 1: No remote configuration capability.</u></b>	<b><u>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</u></b>
<b><u>Category 2: Remote configuration capability, but access is controlled by physical hardware.</u></b>  <b><u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u></b>	<b><u>[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.]</u></b>
<b><u>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</u></b>  <b><u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u></b>	<b><u>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1 000 records are required. (Note: Does not require 1 000 changes to be stored for each parameter.)</u></b>

**[Nonretroactive as of January 1, 1995]**  
**(Table Added 2006)**

**Background/Discussion:** At its October 2005 meeting, the NTETC Measuring Sector discussed the elimination of “Category 2” as well as the NIST Handbook 44 codes for liquid-measuring devices, for example, the Vehicle-tank Meters Code or the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code that do not have specific provisions for electronic security (i.e., audit trails). At the meeting, manufacturers of these devices stated that they have designed metering systems with electronic security with remote configuration capability. They are currently seeking an NTEP CC for these systems. Currently the specific NIST Handbook 44 code for these devices does not address electronic sealing; however, electronic sealing is recognized in the General Code and under the provisions of G-A.3. Special and Unclassified Equipment, the specific audit trail criteria in the LMD Code can be applied, as appropriate. The manufacturers would prefer that each code include specific language similar to that in the LMD Code. During the discussion, the Sector concluded that some of these new applications and other applications currently in use would have been classified as the former “Category 2” of devices. Some NTEP CCs have been issued stating that the device evaluated was a Category 1 device; however, because the mechanism for accessing sealable configuration parameters is not a permanent part of the device and can be removed without affecting normal operation, the device actually meets the definition of remote configuration capability. The manufacturers of these devices believe that no problems have been reported due to their current method of sealing and that it is in appropriate to require them to change the method of sealing to comply with Category 3. The Sector agreed that the decision to remove “Category 2” from the LMD Code and the Mass-flow Meters Code, which may have been based on an incorrect interpretation of remote configuration capability should be reversed and that provisions for electronic sealing should be added to all appropriate liquid-measuring device codes as proposed in Items 330-3, 331-2, 332-1, 334-1, 335-1, 337-1, and 338-1. The Sector agreed to forward that proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting, the Committee agreed that a non-retroactive date of 1995, which is the same as the non-retroactive date in the LMD Code, is appropriate because that date would have been applied to any devices NTEP evaluated using the criteria in G-A.3. Special and Unclassified Equipment. The Committee agreed to present Item 331-2 as shown above for a vote at the 2006 NCWM Annual Meeting. For additional discussion on this issue see Item 330-3.

### 336 WATER METERS

#### 336-1 I Table N.4.2. Flow Rate and Draft Size for Water Meters Special Tests

**Source:** Carryover Item 336-1. (This item originated from the Northeastern Weights and Measures Association (NEWMA) and first appeared on the Committee's 2005 agenda.)

**Discussion/Background:** The Committee is considering a proposal to amend Table N.4.2. as follows:

Table N.4.2. Flow Rate and Draft Size for Water Meters Special Tests						
Meter size (inches)	Intermediate Rate			Minimum Rate		
	Rate of flow (gal/min)	Meter indication/Test Draft		Rate of flow (gal/min)	Meter indication/Test Draft	
		gal	ft <sup>3</sup>		Gal	ft <sup>3</sup>
Less than or equal to 5/8	2	10	1	1/4	<del>5</del> 10	1
3/4	3	10	1	1/2	<del>5</del> 10	1
1	4	10	1	3/4	<del>5</del> 10	1
1 1/2	8	50	5	1 1/2	10	1
2	15	50	5	2	10	1
3	20	50	5	4	10	1
4	40	100	10	7	<del>50</del> 100	5
6	60	100	10	12	<del>50</del> 100	5

(Table Added 2003) (**Amended 200X**)

At the fall 2004 NEWMA meeting, a manufacturer stated that a test draft of 5 gal is not large enough to provide repeatability for dial-indicating water meters sized 1 inch and smaller. The dial indicator for these devices has 100 graduations of 1/10 gal, which means one complete revolution equals 10 gal. The effect of parallax on the reading and gear backlash both contribute to the lack of repeatability of indications when using a 5 gal test draft. The manufacturer recommended that any test of the device include, at a minimum, at least one complete revolution of the dial indicator and submitted proposed changes to Table N.4.2. None of the jurisdictions represented at the NEWMA meeting routinely test water meters; therefore, they could not provide any input on the technical merits of the proposal. However, NEWMA agreed to forward the proposal to the Committee for consideration.

At the 2005 NCWM Interim Meeting, the only concern the Committee heard was that the time required for some tests would increase significantly if the current test draft size were doubled. The manufacturer that submitted the proposal to NEWMA was not at the Interim Meeting. The Committee agreed to make the proposal an information item to provide the opportunity for review and comment from the regional associations, especially jurisdictions routinely conducting water meter tests. If additional support and comments were not received, the Committee decided to consider withdrawing this item.

At the 2005 NCWM Annual Meeting, there was no discussion on this item.

At its September 2005 Annual Meeting, the WWMA heard comments opposing the proposal. Officials indicated that the current minimum test draft size is adequate to determine a meter's performance. Since no data or comments were presented to support the proposal, the WWMA recommends this item be withdrawn.

At its October 2005 meeting, NEWMA continued to support this proposal. Attached below is a portion of the submitter's original documentation package submitted to NEWMA.

The submitter indicated that, for water meters sized 5/8 in, 3/4 in and 1 in indicating in U.S. gallons, a test draft of only 5 gal cannot give proper resolution and is inconsistent with good metering practice that says that test drafts should be selected to yield nominally whole revolutions of the test dial. Only 50 dial divisions are passed utilizing this test draft size. Normal reading parallax and gear backlash would yield resolution of ONLY  $\pm 1.5\%$  under the best conditions. Handbook 44 and good testing practice suggest that a resolution of 1/3 of the normal tolerance band is needed.

Prior to the 2006 NCWM Interim Meeting, the original submitter provided a small amount of test data in an attempt to demonstrate what they see as a problem with the current test criteria. However, because there is only a small amount of data and the data is from only one model of the submitter's own meter design the data is not sufficient to show that there is an industry-wide problem that supports a change to the current requirements in NIST Handbook 44.

At the 2006 NCWM Interim Meeting, the Committee agreed to make Item 336-1 an information item to provide the original submitter additional time for submitting data to the Committee to support the need for change to the size of test drafts for 5/8 in, 3/4 in and 1 in meters. Typically, the Committee would expect to receive extensive data from several manufacturers on a larger number of meters to provide a compelling argument for making the requested change to requirements. The Committee and WMD are willing to provide assistance to the submitter in determining the appropriate number of manufacturers needing to submit data, the number of meters from each manufacturer to be tested, and the numbers and types of tests for each meter in order to provide sufficient justification for making the requested change to the requirements. If supporting data are not received prior to the 2006 NCWM Annual Meeting, Item 336-1 will be withdrawn from the Committee's agenda.

### **337 MASS FLOW METERS**

#### **337-1 V S.3.5. Provision for Sealing and Table S.3.5. Categories of Devices and Methods of Sealing**

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify paragraph S.3.5. and Table S.3.5. as follows:

**S.3.5. Provision for Sealing.** - Adequate provision shall be made for an approved means of security (e.g., data change audit trail) or physically applying security seals in such a manner that no adjustment may be made of:

- (a) any measuring ingement or indicating element; or
- (b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries; ~~or~~ ,
- (c) the zero adjustment mechanism; and
- (d) any metrological parameter that will affect the metrological integrity of the device or system.**

When applicable, the adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

Audit trails shall use the format set forth in Table S.3.5.

(Amended 1992, ~~and~~ 1995 and 2006)



<b>Table S.3.5. Categories of Device and Methods of Sealing</b>	
<b>Category of Device</b>	<b>Method of Sealing</b>
Category 1: No remote configuration capability.	Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.
<p><del>[Category 2 applies to only devices manufactured prior to January 1, 2005. Devices with remote configuration capability manufactured after that date must meet the sealing requirements outlined in Category 3. Devices without remote configuration capability manufactured after that date must meet the minimum criteria outlined in Category 1].</del></p> <p>Category 2: Remote configuration capability, but access is controlled by physical hardware.</p> <p>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</p>	<p>[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.]*</p> <p>[*Nonretroactive as of January 1, 1996]</p>
<p>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</p> <p>[Nonretroactive as of January 1, 1995]</p> <p>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</p> <p>[Nonretroactive as of January 1, 2001]</p> <p><b>Nonretroactive as of January 1, 2005, all devices with remote configuration capability must comply with the sealing requirements of Category 3.</b></p>	<p>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1 000 records are required. (Note: Does not require 1 000 changes to be stored for each parameter.)</p>

Nonretroactive as of January 1, 1995]

(Table Added 1995) (Amended 1995, 1998, and 1999, and 2006)

**Background/Discussion:** At its October 2005 meeting, the NTETC Measuring Sector discussed NIST Handbook 44 codes for liquid-measuring devices, for example, the Vehicle-tank Meters Code or the LPG and Anhydrous Ammonia Liquid-Measuring Devices Cod, that do not have specific provisions for electronic security (i.e., audit trails) in the code. At the meeting, manufacturers of these devices stated that they have designed metering systems with electronic security with remote configuration capability. They are currently seeking an NTEP CC for these systems. Currently the specific NIST Handbook 44 code for these devices does not address electronic sealing, but it is recognized in the General Code and under the provisions of G-A.3. Special and Unclassified Equipment. Accordingly, NTEP made an *ad hoc* decision to apply the criteria in the LMD code to these devices; however, the manufacturers would prefer that each code include specific language similar to that in the LMD Code. During the discussion, the Sector concluded that some of these new applications and other applications currently in use would have been classified as the former device “Category 2” device. Some NTEP CCs have been issued stating that the device evaluated was a Category 1 device; however, because the mechanism for accessing sealable configuration parameters is not a permanent part of the device and can be removed without affecting normal operation the device actually meets the definition of remote configuration capability. The manufacturers of these devices have no plan to change the method of sealing to comply with Category 3. The Sector agreed that the decision to remove “Category 2” from the LMD Code and the Mass-flow Meters Code which was based on an incorrect interpretation of remote configuration capability should be reversed and that provisions for electronic

sealing should be added to all appropriate liquid-measuring device codes as proposed in Items 330-3, 331-2, 332-1, 334-1, 335-1, 337-1, and 338-1. The Sector agreed to forward that proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting, the Committee agreed to present Item 337-1 as shown above for a vote at the 2006 NCWM Annual Meeting. For additional discussion on this issue see Item 330-3.

#### **337-2 V S.4.1. Diversion of Measured Product**

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Modify paragraph S.4.1. as follows:

##### **S.4. Discharge Lines and Valves.**

**S.4.1. Diversion of Measured Product.** - No means shall be provided by which any measured product can be diverted from the measuring instrument. However, two or more delivery outlets may be permanently installed and operated simultaneously, provided that any diversion of flow to other than the intended receiving receptacle cannot be readily accomplished or is readily apparent. Such means include physical barriers, visible valves or indications that make it clear which outlets are in operation, and explanatory signs if deemed necessary.

~~A manually controlled~~ An outlet that may be opened for purging or draining the measuring system, or for recirculating product if recirculation is required in order to maintain the product in a deliverable state, shall be permitted. Effective means shall be provided to prevent the passage of liquid through any such outlet during normal operation of the measuring system and to inhibit meter indications (or advancement of indications) and recorded representations while the outlet is in operation.

(Amended 2002 and 2006)

**Background/Discussion:** The CWMA noted that the requirements in paragraph S.3.1. of Section 3.30. Liquid Measuring Devices and paragraph S.4.1. Diversion of Measured Product of Section 3.37. Mass Flow Meters in NIST Handbook 44 (2005) are not consistent. Paragraph S.3.1. prohibits manual valves for recirculating product or purging or draining the measuring system except for foods and agri-chemicals. On the other hand Paragraph S.4.1. permits manual valves but appears to ban automatic valves by omission, and it makes no distinction for types of products measured as long as the system meets the specified requirements.

Cold weather and physical characteristics make recirculation necessary for a number of products not currently allowed in paragraph S.3.1. of Section 3.30. for example #6 Fuel oil and B100 Biodiesel. Although liquid-measuring devices exist which have NTEP CCs for these high viscosity products, the current wording of Handbook 44 restricts vendors of these products to using mass flow technology if they wish to recirculate their product in order to keep it in a deliverable state. This appears to be the unintended result of the fact that the two codes were written at different times with different input from industry lobbies. The CWMA recommends that retailers of these products not be restricted to using only mass flow meters for commercial measurements if other suitable technologies are available. Likewise, both manual and automatic valves are suitable for recirculating product in discharge lines of these devices, and the use of either type should be allowed.

At the CWMA 2005 Interim Meeting, it was noted that adopting this proposal will create a logical and consistent standard of enforcement for mass flow meters and liquid-measuring devices, which are used for identical applications and products, thus ending an unintentional bias in favor of one technology over the other.

By stating the uniform guidelines for when it is acceptable to allow purge lines and recirculation lines (i.e., the necessity for such lines is to keep the product in a deliverable state), this proposal would eliminate the need for industry to petition the NCWM for each product which requires such special handling. The CWMA agreed to forward the proposal with the recommendation that it be a voting item on the Committee's 2006 agenda.

At the 2006 NCWM Interim Meeting, the Committee heard no opposition to this item and agreed to present it for a vote at the 2006 NCWM Annual Meeting. (See also Item 330-4)

### 337-3 V S.5.1. Location of Marking Information; Retail Motor-Fuel Dispensers

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Add a new paragraph S.5.1. as follows and renumber subsequent paragraphs:

**S.5.1. Location of Marking Information; Retail Motor-Fuel Dispensers. - The required marking information in the General Code, Paragraph G-S.1. Identification shall appear as follows:**

- (a) within 60 cm (24 in) to 150 cm (60 in) from the base of the dispenser;
- (b) either internally and/or externally provided the information is permanent and easily read; and
- (c) on a portion of the device that cannot be readily removed or interchanged (i.e., not on a service access panel).

**Note: The use of a dispenser key or tool to access internal marking information is permitted for retail liquid-measuring devices.**

**[\*Nonretroactive as of January 1, 2003]**

**(Added 2006)**

**Background/Discussion:** At the 2005 meeting of the NTEP laboratories it was recommended that the location of markings requirement from the LMD Code be added to Sections 3.32. LPG and Anhydrous Ammonia Liquid-Measuring Devices and 3.37. Mass Flow Meters. Both codes have other requirements for retail motor-fuel dispensers similar to those in the LMD Code. The laboratories agreed to forward its proposal to the NTETC Measuring Sector for consideration.

At their October 2005 meetings, the NTETC Measuring Sector and the SWMA reviewed the proposal and both agreed to forward it to the Committee for consideration.

At the 2006 NCWM Interim Meeting the Committee heard no comments on Item 337-3 and agreed to present it for a vote at the 2006 NCWM Annual Meeting.

## 338 CARBON DIOXIDE LIQUID-MEASURING DEVICES

### 338-1 V S.2.5. Provision for Sealing and Table S.2.5. Categories of Device and Methods of Sealing

**Source:** National Type Evaluation Technical Committee (NTETC) Measuring Sector

**Recommendation:** Modify paragraph S.2.5. and add new Table S.2.5. Categories of Device and Methods of Sealing as follows:

**S.2.5. Provision for Sealing.** - Adequate provision shall be made for ~~applying security seals in such a manner that no~~ an approved means of security (e.g., data change audit trail) or for physically applying a security seal in such a manner that requires the security seal to be broken before an adjustment or interchange may be made of:

- (a) any measuring~~ingement~~ element or indicating element.
- (b) any adjustable element for controlling delivery rate when such rate tends to affect the accuracy of deliveries, ~~and~~
- (c) any automatic temperature or density compensating system, ~~and~~
- (d) any metrological parameter that will affect the metrological integrity of the device or system.

**When applicable, Any** adjusting mechanism shall be readily accessible for purposes of affixing a security seal.

**Audit trails shall use the format set forth in Table S.2.5.**

**[Nonretroactive as of January 1, 1995]**

**(Amended 2006)**

<b><u>Table S.2.5. Categories of Device and Methods of Sealing</u></b>	
<b><u>Category of Device</u></b>	<b><u>Method of Sealing</u></b>
<b><u>Category 1: No remote configuration capability.</u></b>	<b><u>Seal by physical seal or two event counters: one for calibration parameters and one for configuration parameters.</u></b>
<b><u>Category 2: Remote configuration capability, but access is controlled by physical hardware.</u></b>  <b><u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u></b>	<b><u>[The hardware enabling access for remote communication must be on-site. The hardware must be sealed using a physical seal or an event counter for calibration parameters and an event counter for configuration parameters. The event counters may be located either at the individual measuring device or at the system controller; however, an adequate number of counters must be provided to monitor the calibration and configuration parameters of the individual devices at a location. If the counters are located in the system controller rather than at the individual device, means must be provided to generate a hard copy of the information through an on-site device.]</u></b>
<b><u>Category 3: Remote configuration capability access may be unlimited or controlled through a software switch (e.g., password).</u></b>  <b><u>The device shall clearly indicate that it is in the remote configuration mode and record such message if capable of printing in this mode or shall not operate while in this mode.</u></b>	<b><u>An event logger is required in the device; it must include an event counter (000 to 999), the parameter ID, the date and time of the change, and the new value of the parameter. A printed copy of the information must be available through the device or through another on-site device. The event logger shall have a capacity to retain records equal to 10 times the number of sealable parameters in the device, but not more than 1 000 records are required. (Note: Does not require 1 000 changes to be stored for each parameter.)</u></b>

**[Nonretroactive as of January 1, 1995]**

**(Table Added 2006)**

**Background/Discussion:** At its October 2005 meeting, the NTETC Measuring Sector discussed the elimination of “Category 2” as well as the NIST Handbook 44 codes for liquid-measuring devices, for example, the Vehicle-tank Meters Code or the LPG and Anhydrous Ammonia Liquid-Measuring Devices Code, that do not have specific provisions for electronic security (i.e., audit trails). At the meeting, manufacturers of these devices stated that they have designed metering systems with electronic security with remote configuration capability. They are currently seeking an NTEP CC for these systems. Currently the specific NIST Handbook 44 code for these devices does not address electronic sealing; however, electronic sealing is recognized in the General Code and under the provisions of G-A.3. Special and Unclassified Equipment, the specific audit trail criteria in the LMD Code can be applied, as appropriate. The manufacturers would prefer that each code include specific language similar to that in the LMD Code. During the discussion, the Sector concluded that some of these new applications and other applications currently in use would have been classified as the former “Category 2” of devices. Some NTEP CCs have been issued stating that the device evaluated was a Category 1 device; however, because the mechanism for accessing sealable configuration parameters is not a permanent part of the device and can be removed without affecting normal operation, the device actually meets the definition of remote configuration capability. The manufacturers of these devices believe that no problems have been

reported due to their current method of sealing and that it is in appropriate to require them to change the method of sealing to comply with Category 3. The Sector agreed that the decision to remove “Category 2” from the LMD Code and the Mass-flow Meters Code, which may have been based on an incorrect interpretation of remote configuration capability should be reversed and that provisions for electronic sealing should be added to all appropriate liquid-measuring device codes as proposed in Items 330-3, 331-2, 332-1, 334-1, 335-1, 337-1, and 338-1. The Sector agreed to forward that proposal to the Committee for consideration.

At the 2006 NCWM Interim Meeting, the Committee agreed that a non-retroactive date of 1995, which is the same as the non-retroactive date in the LMD Code, is appropriate because that date would have been applied to any devices NTEP evaluated using the criteria in G-A.3. Special and Unclassified Equipment. The Committee agreed to present Item 331-2 as shown above for a vote at the 2006 NCWM Annual Meeting. For additional discussion on this issue, see Item 330-3.

### 360 OTHER ITEMS

#### 360-1 I International Organization of Legal Metrology (OIML) Report

Many issues before the OIML, the Asian-Pacific Legal Metrology Forum (APLMF), and other international groups are within the purview of the Committee. Additional information on OIML activities appear in the 2006 Board of Directors Interim Report and on the OIML website at <http://www.oiml.org>. WMD staff provided updates on OIML activities during the open hearing session at the 2006 NCWM Interim Meeting. Further updates are planned for the open hearing session to be held at the July 2006 NCWM Annual Meeting in Chicago, Illinois. For more information on specific OIML-related device activities contact the WMD staff listed in the table below. The OIML projects listed below represent only currently active projects. For additional information on other OIML device activities that involve WMD staff, please contact WMD using the information listed below:

NIST Weights and Measures Division (WMD) Contact List				
Staff	Telephone	Email	Responsibilities	Postal Mail or Fax
Mr. Steven Cook (LMD)	(301) 975-4003	steven.cook@nist.gov	<ul style="list-style-type: none"> <li>•R 60 “Metrological Regulations for Load Cells”</li> <li>•R 76 “Non-automatic Weighing Instruments”</li> </ul>	NIST WMD 100 Bureau Dr. MS 2600 Gaithersburg, MD 20899-2600  Tel: (301) 975-4004  Fax: (301) 926-0647
Dr. Charles Ehrlich (ILM)	(301) 975-4834	charles.ehrlich@nist.gov	<ul style="list-style-type: none"> <li>•B 10 “Framework for a Mutual Acceptance Arrangement (MAA) on OIML Type Evaluations”</li> <li>•TC 3/SC 5 “Expression of Uncertainty in Measurement in Legal Metrology Applications,”</li> <li>“Guidelines for the Application of ISO/IEC 17025 to the Assessment of Laboratories Performing Type Evaluation Tests,” &amp; “OIML Procedures for Review of Laboratories to Enable Mutual Acceptance of Test Results and OIML Certificates of Conformity”</li> </ul>	
Mr. Richard Harshman (LMD)	(301) 975-8107	richard.harshman@nist.gov	<ul style="list-style-type: none"> <li>•R 106 “Automatic Rail-weighbridges”</li> <li>•R 107 “Discontinuous Totalizing Automatic Weighing Instruments” (totalizing hopper weighers)</li> <li>•R 134 “Automatic Instruments for Weighing Road Vehicles In-Motion”</li> </ul>	

NIST Weights and Measures Division (WMD) Contact List (continued)				
Staff	Telephone	Email	Responsibilities	Postal Mail or Fax
Ms. Diane Lee McGowan (LMD)	(301) 975-4405	diane.lee@nist.gov	<ul style="list-style-type: none"> <li>•R 59 “Moisture Meters for Cereal Grains and Oilseeds”</li> <li>•TC 17/SC 8 “Measuring Instruments for Protein Determination in Grains”</li> </ul>	
Mr. Ralph Richter (ILM)	(301) 975-3997	ralph.richter@nist.gov	<ul style="list-style-type: none"> <li>•R 35 “Material Measures of Length for General Use”</li> <li>•R 105 &amp; R 117 “Measuring Systems for Liquids Other Than Water” (includes Direct Mass)</li> <li>•R 118 “Testing Procedures and Test Report Format for Pattern Examination of Fuel Dispensers for Motor Vehicles”</li> <li>•TC 3/SC 4 “Verification Period of Utility Meters Using Sampling Inspections”</li> </ul>	
Mr. Wayne Stiefel (ILM)	(301) 975-4011	s.stiefel@nist.gov	<ul style="list-style-type: none"> <li>•TC 8/SC 8 “Gas Meters” (Diaphragm, Rotary Piston, &amp; Turbine Gas Meters)</li> <li>•R 49 “Water Meters” (Cold Potable Water &amp; Hot Water Meters)</li> <li>•R 71 “Fixed Storage Tanks”</li> <li>•R 80 “Road and Rail Tankers”</li> <li>•R 85 “Automatic Level Gauges for Measuring the Level of Liquid in Fixed Storage Tanks”</li> <li>•TC 5/SC 2 “General Requirements for Software Controlled Measuring Instruments”</li> <li>•TC 8/SC 7 P1 “Measuring Systems for Gaseous Fuel” (i.e., large pipelines)</li> <li>•TC 8/SC 7 P2 “Compressed Gaseous Fuels Measuring Systems for Vehicles”</li> </ul>	
Dr. Ambler Thompson (ILM)	(301) 975-2333	ambler@nist.gov	<ul style="list-style-type: none"> <li>•D 16 “Principles of Assurance of Metrological Control”</li> <li>•D 19 “Pattern Evaluation and Pattern Approval”</li> <li>•D 20 “Initial and Subsequent Verification of Measuring Instruments and Processes”</li> <li>•D 27 Initial Verification of Measuring Instruments Using the Manufacturer’s Quality Management System”</li> <li>•R 34 “Accuracy Classes of Measuring Instruments”</li> <li>•R 46 “Active Electrical Energy Meters for Direct Connection of Class 2”</li> </ul>	

NIST Weights and Measures Division (WMD) Contact List (continued)				
Staff	Telephone	Email	Responsibilities	Postal Mail or Fax
Ms. Juana Williams (LMD)	(301) 975-3989	juana.williams@nist.gov	•R 21 “Taximeters”	
LIST OF ACRONYMS				
ILM – International Legal Metrology Group LM – Laws and Metric Group	LMD – Legal Metrology Devices Group	B – Basic Publication D – Document P – Project	R – Recommendation SC – Subcommittee TC – Technical Committee	

### 360-2 W Appendix A – Fundamental Considerations Section 11 Health and Safety Considerations

**Source:** Western Weights and Measures Association (WWMA)

**Discussion:** The Committee considered a proposal to add a new Section 11. Health and Safety Considerations to NIST Handbook 44 Appendix A as follows:

#### 11. Health and Safety Considerations

**11.1. Health and Safety. - This handbook cannot address all of the health and safety issues associated with device inspections. During the inspection and testing of weighing and measuring equipment safety is a major consideration in conducting inspections. If the inspection cannot be conducted in a safe manner, the inspector will terminate the inspection.**

**The inspector is responsible for determining appropriate safety and health hazards before beginning an inspection. The inspector should make himself/herself familiar with all warnings associated with the equipment and facility prior to conducting any inspection and must comply with Federal, state, local and agency laws, regulations and policies in effect at the time of the inspection. Inspectors will bring hazards or deficiencies to the attention of the business owner/operator and to the appropriate Weights and Measures supervisor. It is only through good judgment and conscientious adherence to safety regulations and procedures on a regular basis that the inspector can decrease the likelihood of personal injury and damage to property and equipment.**

**(Added 200X)**

**Discussion:** At its September 2005 Annual Meeting, the WWMA reviewed a proposal to add safety considerations to the General Code section of NIST Handbook 44. While the WWMA supported the concept, it believed that Appendix A, Fundamental Consideration was a more appropriate place to add the proposed language. Therefore, the WWMA submitted the proposal to the Committee for consideration.

At their 2005 fall meetings, the remaining regional associations reviewed the WWMA proposal. The CWMA did not believe that safety is a NIST Handbook 44 issue. NEWMA supported the proposal as a developing item and recommended the NCWM L&R Committee consider a similar proposal for inclusion in NIST Handbook 130 "Uniform Laws and Regulations in the areas of legal metrology and engine fuel quality." The SWMA recommended the item be withdrawn because safety considerations are already adequately addressed in the EPOs.

At the 2006 NCWM Interim Meeting, the Committee acknowledged that safety is a primary concern. However, the Committee agreed with the CWMA and the SWMA that safety is already adequately addressed in the EPOs and consequently, withdrew Item 360-2 from its Agenda.

### **360-3 W Add International Terms that are Synonymous to NIST Handbook 44 Terms in Appendix D; Definitions**

**Source:** Carryover Item 360-4. (This item originated from the Northeastern Weights and Measures Association (NEWMA) and first appeared on the Committee's 2002 agenda.)

**Discussion:** Many NIST and OIML technical concepts and procedures are in harmony, yet there are significant differences in terminology used by the two organizations. The harmonization of language is not necessary to obtain uniform legal requirements provided the intent of the requirements are essentially equivalent; however, improvements should be considered to revise language that is confusing or has the potential for misinterpretation. This item was intended to familiarize the public and private sectors with a proposed approach to modify Appendix D. The USNWG was to identify terms or definitions that are equivalent to international vocabulary by placing the corresponding OIML term in parentheses adjacent to the NIST Handbook 44 term.

Later stages of the project would involve amending Appendix D to clarify terminology for international participants in the proposed Mutual Acceptance Arrangement (MAA), where it remains imperative that all affected parties are aware of and understand each other's requirements. Terms can have an entirely different meaning in NIST Handbook 44 than they do in R 76. NIST Handbook 44 is also inconsistent in the use of many terms such as "division," "increment," and "interval." One additional goal was to eliminate any confusion about other frequently used terms such as "device," "element," "mechanism," "scale," "weigher," and "balance."

Several regional weights and measures associations stated their positions on the proposal. NEWMA supported this initiative. The WWMA requested the proposal remain an information item. The CWMA believes this was not a field issue and indicated that the issue is covered in NCWM Publication 14; therefore, it recommended that the proposal be withdrawn from the Committee's agenda.

Currently, the USNWG on R 76 "Non-automatic Weighing Instruments" has been unable to dedicate resources to work on a proposal to amend NIST Handbook 44 Appendix D, Definitions to include international terminology that is synonymous with Handbook 44 definitions. The Committee agreed to withdraw the item from its agenda until sufficient resources can be devoted to fully developing this issue.

### **360-4 Developing Items**

The NCWM established a category of items called "Developing Items" as a mechanism to share information about emerging issues which have merit and are of national interest, but that have not received sufficient review by all parties affected by the proposal or that may be insufficiently developed to warrant review by the Committee. The developing items are currently under review by at least one regional association or technical committee.

Developing Items are listed in Appendix A according to the specific NIST Handbook 44 Code section under which they fall. Periodically, proposals will be removed from the developing item agenda without further action because the submitter recommends that it be withdrawn. Any remaining proposals will be renumbered accordingly.

The Committee encourages interested parties to examine the proposals included in Appendix A and send their comments to the contact listed in each item. The Committee asks that the regional associations and NTETC Sectors continue their work to develop fully each proposal. Should an association or Sector decide to discontinue work on an item, the Committee asks that it be notified.



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Clark Cooney, Oregon, Chairman (1)

Carol P. Fulmer, South Carolina (3)

Todd R. Lucas, Ohio (4)

Brett Saum, San Luis Obispo County, California (5)

Michael J. Sikula, New York (2)

Ted Kingsbury, Canada, Technical Advisor

Richard Suiter, NIST, Technical Advisor

Juana Williams, NIST, Technical Advisor

## **Specifications and Tolerances Committee**

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## Appendix A

### Item 360-4: Developing Item

#### Part 1, Item 1, General Code: G-UR.4.1.1. Proper Operating Conditions for Retail Motor-Fuel Devices

**Source:** Central Weights and Measures Association (CWMA)

**Recommendation:** Add a new paragraph G-UR.4.1.1. as follows:

**G-UR.4.1.1. Proper Operating Condition for Retail Motor-Fuel Devices. - The equipment will not be considered maintained in proper operating condition when one or more of the following conditions are met:**

**(a) Multiple (four or more) devices, defined as grades or types of fuel, in service at a single place of business shall not be considered in proper operating condition under any of the following:**

**(1) The calculated average error of all devices is in favor of the device owner/user by more than one-third the maintenance tolerance.**

**(2) The calculated average error for any particular grade or type of fuel averages in favor of the device owner/user by more than one-third the maintenance tolerance.**

**Note: Special tests should not be included in calculations unless the special test alone is in favor of the device owner/user by more than one-third the maintenance tolerance.**

**(Added 200X)**

At its 2005 CWMA Interim Meeting the association membership reviewed a proposal to add a new paragraph G-UR.4.1.1. Proper Operating Condition to aid field officials in determining if retail motor-fuel dispensers are being maintained in accordance with G-UR.4.1. Maintenance of Equipment.

In 1991 this issue was brought before the NCWM as an information item. The intent of the proposal at that time was to provide guidance for states in the interpretation of General Code Paragraph G-UR.4.1. Maintenance of Equipment. In 1993, the State of Wisconsin adopted a policy that defined “predominance” as shown in the proposal. That policy was similar to the one proposed in 1991 except that Wisconsin was felt that one-third acceptance tolerance was too stringent as there was a need to take into account normal variability in testing procedures, equipment, and environmental conditions found in the field. Wisconsin, therefore, adopted a greater than one-third of maintenance tolerance guideline. In 2003 the Wisconsin policy was further defined by deleting the language “all devices are found to be in error in a direction favorable to the device user.” The new guideline for permissible errors was “sixty percent or more of the devices are found to be in error in favor of the device owner/user by more than one-third of the maintenance tolerance.” Both of these criteria were seldom used in the field because they made the policy confusing.

Recently NIST conducted a national survey of RMFD testing and the results point to a need to gain more uniformity in the application of tolerances. There is a wide variation in how different states handle the “predominance” question. Strides should be continually made to gain uniformity. It is felt that the adoption of the proposed requirement G-UR.4.1.1. would be one step toward gaining greater uniformity. With more than five years of history using the proposed criteria Wisconsin sees a relatively low number of devices rejected on the basis of “predominance” and most station owners and all service companies have a working understanding of predominance.

The CWMA agreed to submit the modified proposal to the NCWM S&T Committee with a recommendation that it be placed on the Committee’s Agenda as a “Developing Item”.

#### Part 2, Item 1 Scales: S.2.1.7. Tare Rounding on a Multiple Range Scale

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Add a new paragraph S.2.1.7. as follows:

**S.2.1.7. Tare Rounding on a Multiple Range Scale. - A multiple range scale with tare capability must indicate and record values that satisfy the equation:**

$$\text{net} = \text{gross} - \text{tare}$$

**and round the tare value up to the larger division size when entering the larger division.**  
**(Added 200X)**

**Discussion:** Currently, there may be a conflict between NIST Handbook 44 requirements and NCWM Publication 14 policy for rounding tare values on multiple range scales. NIST Handbook 44 General Code paragraph G-S.5.2.2.(c) Digital Indication and Representation requires that digital values round off to the nearest minimum unit that can be indicated or recorded. Also in question is a possible conflict with NIST Handbook 130 guidelines which specify that in no case shall rounded values result in overstating the net quantity. NTEP policy permits the operation of tare on multiple range scales to round down thus overstating the quantity. The proposal was developed to eliminate any conflict in the operation of the tare function on multiple range scales. NTEP is also revising its tare criteria to ensure there is no further conflict with NIST Handbook 44. The SWMA recognizes that OIML permits rounding tare down, but believes that customers are not able to make adjustments in unit prices to compensate for losses when tare is rounded down whereas businesses can adjust the price to compensate for overhead expenses and losses that occur if tare is rounded up.

The NTETC Weighing Sector established a work group chaired by Gary Lameris (Hobart Corporation) to fully develop this proposal. To comment on this proposal contact Gary Lameris, Hobart Corporation, by email at gary.lameris@hobartcorp.com, by telephone at (937) 332-3053 or by fax at (937) 332-3007.

### **Part 3, Item 1 Belt-Conveyor Scale Systems: UR.3.2.(c) Maintenance; Zero Load Tests**

**Source:** Western Weights and Measures Association (WWMA)

**Recommendation:** Modify UR.3.2.(c) as follows:

**UR.3.2. Maintenance.** - Belt-conveyor scales and idlers shall be maintained and serviced in accordance with manufacturer's instructions and the following:

.  
. .

- (c) **Zero-load tests, S**simulated load tests or material tests, ~~and zero-load tests~~ shall be conducted at periodic intervals between official tests in order to provide reasonable assurance that the device is performing correctly.

**(Amended 200X)**

**The action to be taken as a result of the zero-load tests is as follows:**  
**(Added 2000X)**

- **if the change in the zero-load reference is greater than  $\pm 0.25$  %, inspect the conveyor and weighing area to be sure it conforms to UR.2. and correct any deficiencies;**  
**(Added 200X)**
- **if the change in the zero-load reference is greater than 0.5 % in a 24-hour period, inspect the conveyor and weighing area to be sure it conforms to UR.2. Installation Requirements, correct any deficiencies, and repeat the zero-load test.**  
**(Added 200X)**

The action to be taken as a result of the material tests or simulated load tests is as follows:  
~~(Amended 2002)~~

- if the error is less than 0.25 %, no adjustment is to be made;
- if the error is at least 0.25 % but not more than 0.6 %, **inspect the conveyor and weighing area to be sure it conforms to UR.2. Installation Requirements, correct any deficiencies, and repeat the simulated or materials test.**  
(Amended 1991 **and 200X**)

**An adjustment to the span calibration** may be made if **no deficiencies were identified during the above inspection any correction to the installation did not result in errors less than or equal to  $\pm 0.25$  %.** ~~The~~ official with statutory authority is notified **if an adjustment is made to the span calibration;**  
(Amended 1991 **and 200X**)

- if the error is greater than 0.6 % but does not exceed 0.75 %, **inspect the conveyor and weighing area to be sure it conforms to UR.2. Installation Requirements, correct any deficiencies, and repeat the simulated or materials test;**

~~Adjustments~~ **to the span calibration** shall be made only by a competent service person and the official with statutory authority shall be notified **if no deficiencies were identified during the above inspection and any correction to the installation did not result in errors less than or equal to  $\pm 0.25$  %.** After such an adjustment **to the span calibration,** ~~if the results of a subsequent test require adjustment in the same direction,~~ **the official with statutory authority shall be notified** **and** an official test shall be conducted;  
(Amended 1991 **and 200X**)

- if the error is greater than 0.75 %, an official test is required.  
(Amended 1987 and 200X)

**Discussion:** NIST Handbook 44 gives limited guidance on what to do with zero-load test results. Belt loss is not the only factor which may require the scale operator to make physical adjustments to the belt-conveyor system to correct for deficiencies. For example, a dirty scale structure or a worn belt scraper will increase the zero reference number and the test results may exceed tolerances.

The scale user/owner has to protect his interest between weighing transactions. At present, some belt-conveyor systems may have error greater than 0.5 % in zero reference over a 24-hour period. The belt is part of tare (net load) on any empty running system and the system must be maintained to within tolerance at all times.

The WWMA indicated that, based on comments heard in September 2005, only part of the proposal has merit. Consequently, the WWMA recommended the proposal become a developing item.

To comment on this proposal, contact Steven Cook, NIST technical advisor to the NTETC Weighing Sector, at [steven.cook@nist.gov](mailto:steven.cook@nist.gov), by telephone at (301) 975-4003, by fax at (301) 926-0647 or at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

### **Part 3, Item 2 Belt-Conveyor Scale Systems: UR.2.2.(n) Belt Alignment**

**Source:** Southern Weights and Measures Association (SWMA)

**Recommendation:** Modify paragraph UR.2.2.(n) as follows:

### UR.2.2. Conveyor Installation

**(n) Belt Alignment.** – The belt shall be centered on the idlers in the weighing area and shall track in practically the same position whether empty or loaded. The belt shall not extend beyond the edge of the idler roller in any area of the conveyor.  
(Amended 1998 and 200X)

**Discussion:** The WWMA considered proposed changes to paragraph UR.2.2. to provide needed guidance on belt tracking before, during, or after a material tests. Ideally, the belt should be in the same location at full load or empty conditions. If the belt location or belt tension is not constant, scale accuracy is affected. Consequently, the WWMA agreed to develop a proposal to modify paragraph UR.2.2. to make the scale user/owner aware that the belt position must be monitored and maintained.

The CWMA supported the proposal but recommended removing any ambiguity by deleting the word “practically” from the proposed text. The SWMA supported the proposal being a voting item on the Committee’s 2006 agenda.

The Committee considered the NCWM Review Panel’s recommendations and heard comments from industry. The Review Panel indicated the proposal should have included national data that demonstrated a need for modifying paragraph UR.2.2. The Review Panel, agreed with the WWMA, the regional association where the proposed language was first heard, that the proposal should be a developing item. One representative from the belt-conveyor scale service industry indicated there are too many factors that influence belt tracking to ensure a belt is centered at all times. The service representative recommended that the belt should not extend beyond the edge of the idler roller in any area of the conveyor on the carrying side or touch holding brackets on the return side to reduce any detrimental affects on accuracy. Industry representatives indicated the design of idlers and scales are such that the belt is not intended to stay in exact center. Industry also indicated there is no mechanism available to monitor the belt’s tracking 24 hours a day seven days a week. Industry requested either specifications for what constitutes “center” or an acceptable “range of center” for belt tracking. Although the SWMA reported the proposal was ready for national consideration, the Committee agreed that it is more appropriate to make the proposal a developing item until there is some clear indication that belt alignment can be tracked for maintenance and accuracy purposes.

To comment on this proposal, contact Steven Cook, NIST technical advisor to the NTETC Weighing Sector, at [steven.cook@nist.gov](mailto:steven.cook@nist.gov), by telephone at (301) 975-4003, by fax at (301) 926-0647 or at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.

### Part 4, Item 1 Automatic Weighing Systems: Temperature Limits

**Source:** National Type Evaluation Technical Committee (NTETC) Weighing Sector

**Recommendation:** The Weighing Sector asked for the Committee’s interpretation of how to apply marking requirements for temperature limits based on the thermal conditions developed during type evaluation laboratory testing and those conditions that exist in real-world environments. The Sector also questioned why requirements that address instances where equipment operates in temperatures that are outside of the -10 °C to 40 °C temperature range such as Scales Code paragraph T.N.2.3. Subsequent Examination Verification are not included in all weighing device codes. The Sector also noted there are inconsistencies in the language that specifies temperature requirements throughout the weighing device codes. The Weighing Sector agreed this is an important issue, yet recognizes the Committee may require time to research the codes and policies established on this topic. Consequently, the Weighing Sector recommended this as a developing item.

The Weighing Sector agreed that no evaluation would be conducted for temperature ranges outside of laboratory capabilities, which are -10 °C to 40 °C while it awaits input from the Committee. The Weighing Sector’s *ad hoc* policy is contrary to an earlier NTEP policy where NTEP agreed to require testing to demonstrate compliance with the manufacturer’s specified temperature range, including accepting data from recognized and approved laboratories for tests performed at temperature ranges that exceeded the -10 °C to 40 °C temperature range.

To comment on this proposal, contact Steven Cook, NIST technical advisor to the NTETC Weighing Sector, at [steven.cook@nist.gov](mailto:steven.cook@nist.gov), by telephone at (301) 975-4003, by fax at (301) 926-0647 or at NIST WMD, 100 Bureau Drive MS 2600, Gaithersburg, MD 20899-2600.